Supporting Information

Efficient One-Pot Quinoline Derivative Synthesis from Acetophenone and Allyl Alcohols

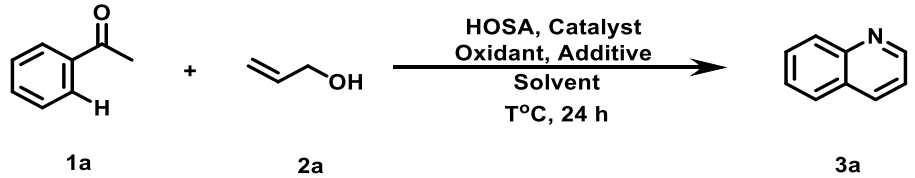
1. General Information

Catalytic reactions were carried out in Schlenk tubes using pre-dried glassware. Various products (quinoline) were synthesized according to previously described procedures. Commercially available reagents, such as Catalysts and substrates 1 were purchased from Energy Chemical, and used without purification unless otherwise noted. Column chromatography purification was performed using 200–300 mesh silica gel. NMR spectra were mostly recorded for ^{1}H NMR at 400 MHz and for ^{13}C NMR at 101 MHz. $CDCl_3$ and DMSO-D_6 were used as solvents. Chemical shifts were referenced relative to residual solvent signal ($CDCl_3$: ^{1}H NMR: δ 7.26 ppm, ^{13}C NMR: δ 77.16 ppm; DMSO-D_6: ^{1}H NMR: δ 2.50 ppm, ^{13}C NMR: δ 39.52 ppm). The following abbreviations are used to describe peak patterns where appropriate: br = broad, s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet. Coupling constants (J) are reported in Hertz (Hz). HRMS was performed on Agilent Technologies 6224 TOF LC/MS apparatus (ESI).

2. Experimental Section

2.1. Preliminary optimization of reaction conditions

Table S1. Reaction condition screening of 3a.



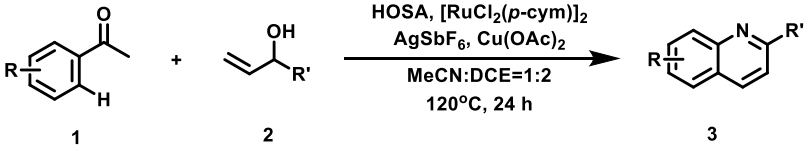
1a 2a 3a

Entry	Catalyst	Oxidant	Solvent	T(°C)	Additive	Yield (%)[b]
1	$[Cp^*RhCl_2]_2$	$AgSbF_6$	MeCN:HFIP=1:2	120℃	$Cu(OAc)_2$	30
2	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:HFIP=1:2	120℃	$Cu(OAc)_2$	45
3	$[Cp^*IrCl_2]_2$	$AgSbF_6$	MeCN:HFIP=1:2	120℃	$Cu(OAc)_2$	NR
4	$[Cp^*RuCl_2]_2$	$AgSbF_6$	MeCN:HFIP=1:2	120℃	$Cu(OAc)_2$	NR
5	Cp*CoCOI2	$AgSbF_6$	MeCN:HFIP=1:2	120℃	$Cu(OAc)_2$	NR
6	$[RuCl_2(p\text{-cymene})]_2$	Ag_2O	MeCN:HFIP=1:2	120℃	$Cu(OAc)_2$	NR
7	$[RuCl_2(p\text{-cymene})]_2$	Ag_2CO_3	MeCN:HFIP=1:2	120℃	$Cu(OAc)_2$	26
8	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:DMF=1:2	120℃	$Cu(OAc)_2$	NR
9	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:MeOH=1:2	120℃	$Cu(OAc)_2$	48
10	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	**MeCN:DCE=1:2**	**120℃**	$Cu(OAc)_2$	**85**
11	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:DCE=1:2	100℃	$Cu(OAc)_2$	36
12	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:DCE=1:2	110℃	$Cu(OAc)_2$	77
13	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:DCE=1:2	130℃	$Cu(OAc)_2$	83
14	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:DCE=1:2	120℃	AcOH	30
15	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:DCE=1:2	120℃	NaOAc	45
16	$[RuCl_2(p\text{-cymene})]_2$	$AgSbF_6$	MeCN:DCE=1:2	120℃	CsOAc	50

[a]Reaction conditions:**1** (0.5 mmol), **2** (0.75 mmol), HOSA(1.0 mmol), Catalyst(5.0 mol %), Oxidant (1.0 mmol), Additive(2 mmol), in the solvent (3.0mL) for 24h. [b]Yields of isolated products.

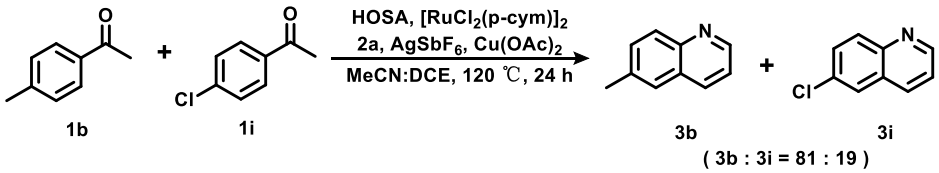
2.2. Synthesis and characterization of products 3

2.2.1 Preparation of quinoline products (Method A)



A reaction tube (10 mL) with magnetic stir bar was charged with compound 1 (0.5 mmol, 1.0 equiv), HOSA (1.0 mmol) and 1 mL MeCN. Then the mixture was stirred at room temperature for 3h. TLC (PE: EA= 4:1) showed that the complete consumption of compound 1. Then compound 2 (0.625 mmol), $[RuCl_2(p\text{-cym})]_2$ (0.025mmol, 5 mol%), $AgSbF_6$ (0.25 mmol, 0.5 equiv), $Cu(OAc)_2$ (1.0 mmol, 2.0 equiv) and 2mL DCE was added, The reaction system was stirred at 120 ºC for 24h. Then the solvent was removed under reduced pressure. The residue was purified by silica gel column chromatography to afford product **3**.

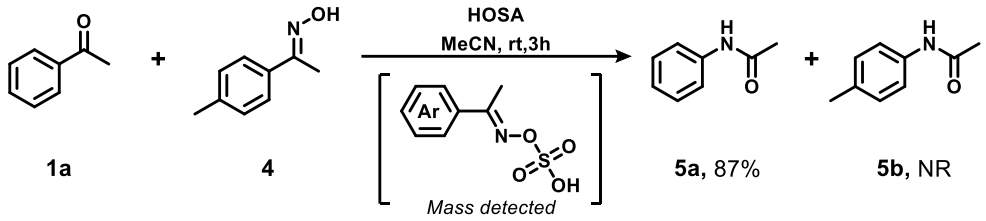
2.3. Competitive Experiment



A reaction tube (10 mL) with magnetic stir bar was charged with compound **1b** (67.1 mg), HOSA (113.1 mg) and 1.0 mL MeCN. Then the mixture was stirred at room temperature for 3h. Another reaction tube (10 mL) with magnetic stir bar was charged with compound **1i** (77.3 mg), HOSA(113.1 mg) and 1.0 mL MeCN. Then the mixture was stirred at room temperature for 3h. TLC (PET: EtOAc= 4:1) showed that the complete consumption of compound **1b** and **1i.** Then compound **2a** (58.1 mg),$[RuCl_2(p\text{-}cym)]_2$ (0.025mmol, 5 mol%), $AgSbF_6$ (0.25 mmol, 0.5 equiv), $Cu(OAc)_2$ (1.0 mmol, 2.0 equiv) and 4mL DCE was added, The reaction system was stirred at 120 °C for 24h.

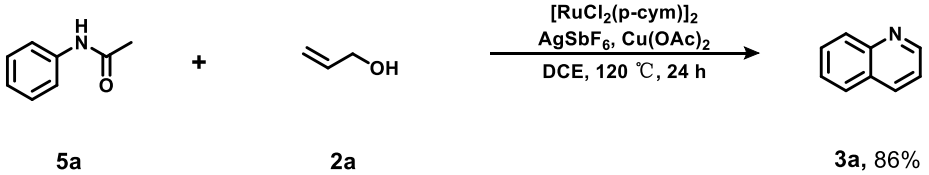
After cooling to room temperature, TLC (PET: EtOAc= 4:1) showed that the reaction was complete. Then the solvent was removed under reduced pressure. The residue was purified by silica gel column chromatography to afford **3b** as yellow oil 58.0 mg and **3j** as yellow oil 15.5 mg.

2.4. Rrearrangement reactions



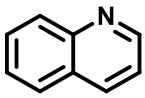
A reaction tube (10 mL) with magnetic stir bar was charged with compound **1a** (60.1 mg), **4**(74.6 mg) ,HOSA(113.1 mg)and 2.0 mL MeCN. Then the mixture was stirred at room temperature for 3h. TLC (PET: EtOAc= 4:1) showed that the reaction was complete. Then the solvent was removed under reduced pressure. The residue was purified by silica gel column chromatography to afford **5a** as white solids (58.8 mg).**N-phenylacetamide(5a):** ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (s, 1H), 7.50 (d, J = 8.1 Hz, 2H), 7.30 (t, J = 7.7 Hz, 2H), 7.09 (t, J = 7.4 Hz, 1H), 2.15 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 168.83, 138.05, 129.05, 124.41, 120.12, 24.61.HRMS (ESI) *m/z* calcd for $C_8H_{10}NO$ $[M+H]^+$ 136.0757, found 136.0758.

2.5. Synthesis of 3a with 5a

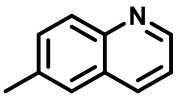


A reaction tube (10 mL) with magnetic stir bar was charged with compound **5a**(0.5 mmol, 1.0 equiv), compound **2a** (43.6mg), $[RuCl_2(p\text{-}cym)]_2$ (0.025mmol, 5 mol%), $AgSbF_6$ (0.25 mmol, 0.5 equiv), $Cu(OAc)_2$ (1.0 mmol, 2.0 equiv) and 2 mL DCE was added, The reaction system was stirred at 120 °C for 24h. After cooling to room temperature, TLC (PE: EA= 4:1) showed that the reaction was complete. Then the solvent was removed under reduced pressure. The residue was purified by silica gel column chromatography to afford product **3a** as yellow oil (88.8 mg) in 86 % yield.

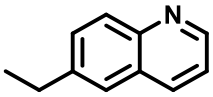
3. Experimental data for described substances



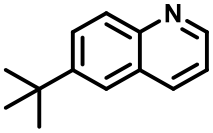
quinoline(3a)： he title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (54.9 mg) in 85 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.88 (d, *J* = 4.1 Hz, 1H), 8.10 (d, *J* = 8.6 Hz, 2H), 7.77 (d, *J* = 8.2 Hz, 1H), 7.68 (t, *J* = 7.7 Hz, 1H), 7.51 (t, *J* = 7.5 Hz, 1H), 7.36-7.33 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 150.39, 148.23, 136.15, 129.52, 129.40, 128.31, 127.83, 126.59, 121.11. HRMS (ESI) *m/z* calcd for C_9H_8N $[M+H]^+$ 130.0651, found 130.0652.



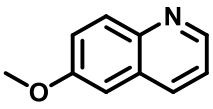
6-methylquinoline(3b)： he title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (57.3 mg) in 80 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.82 (d, *J* = 4.1 Hz, 1H), 8.02-7.97 (m, 2H), 7.52 (d, *J* = 9.7 Hz, 2H), 7.34-7.30 (m, 1H), 2.51 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 149.57, 146.92, 136.45, 135.45, 131.82, 129.13, 128.37, 126.65, 121.13, 21.64. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}N$ $[M+H]^+$ 144.0808, found 144.0807.



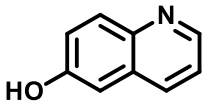
6-ethylquinoline(3c): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (62.9 mg) in 80 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.85 – 8.80 (m, 1H), 8.07 – 7.98 (m, 2H), 7.55 (d, *J* = 7.4 Hz, 2H), 7.33-7.30 (m, 1H), 2.83-2.77 (m, 2H), 1.31 (t, *J* = 7.6 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 149.59, 147.12, 142.63, 135.60, 130.76, 129.26, 128.40, 125.31, 121.07, 28.89, 15.42. HRMS (ESI) *m/z* calcd for $C_{11}H_{12}N$ $[M+H]^+$ 158.0964, found 158.0963.



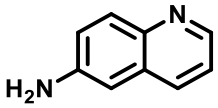
6-(tert-butyl)quinoline(3d): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (75.0 mg) in 81 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.84 (d, *J* = 4.2 Hz, 1H), 8.10 (d, *J* = 8.3 Hz, 1H), 8.05 (d, *J* = 8.9 Hz, 1H), 7.80 (d, *J* = 8.9 Hz, 1H), 7.71 (s, 1H), 7.36-7.33 (m, 1H), 1.41 (s, 9H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 149.80, 149.45, 146.88, 136.16, 128.98, 128.56, 128.08, 122.78, 121.08, 35.00, 31.27. HRMS (ESI) *m/z* calcd for $C_{13}H_{16}N$ $[M+H]^+$ 186.1277, found 186.1275.



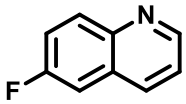
6-methoxyquinoline(3e): he title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (62.9 mg) in 79 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.76 – 8.69 (m, 1H), 8.00-7.96 (m, 2H), 7.37 – 7.27 (m, 2H), 7.01 (s, 1H), 3.88 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.74, 147.93, 144.41, 134.85, 130.83, 129.33, 122.34, 121.40, 105.12, 55.54. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}NO$ $[M+H]^+$ 160.0757, found 160.0756.



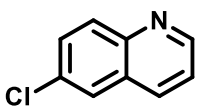
quinolin-6-ol(3f): The title compound was obtained by column chromatography (PE:EA = 10:1) as yellow oil (14.5 mg) in 20 % yield according to the Method A. ^{1}H NMR (400 MHz, DMSO) δ 9.87 (s, 1H), 8.49 – 8.36 (m, 1H), 7.89 (d, *J* = 8.3 Hz, 1H), 7.66 (d, *J* = 9.1 Hz, 1H), 7.16 – 7.09 (m, 2H), 6.94 (s, 1H). ^{13}C NMR (101 MHz, DMSO) δ 155.57, 147.16, 143.11, 134.20, 130.47, 129.40, 122.08, 121.44, 108.4. HRMS (ESI) *m/z* calcd for C_9H_8NO $[M+H]^+$ 146.06, found 146.0589.



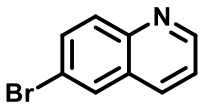
quinolin-6-amine(3g): The title compound was obtained by column chromatography (PE:EA = 10:1) as yellow solids (13.6 mg) in 19 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.62 (d, *J* = 4.0 Hz, 1H), 7.90-7.82 (m, 2H), 7.24-7.21 (m, 1H), 7.12-7.09 (m, 1H), 6.84 (s, 1H), 3.94 (s, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 146.77, 144.78, 143.39, 133.82, 130.48, 129.82, 121.64, 121.42, 107.39. HRMS (ESI) *m/z* calcd for $C_9H_9N_2$ $[M+H]^+$ 145.076, found 145.0758.



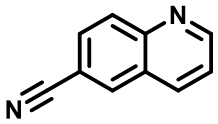
6-fluoroquinoline(3h): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (43.4 mg) in 59 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.84 (d, *J* = 4.1 Hz, 1H), 8.10 – 8.04 (m, 2H), 7.47-7.44 (m, 1H), 7.40 – 7.34 (m, 2H). ^{13}C NMR (101 MHz, Chloroform-*d*) δ 73.32, 73.54, 82.37, 82.63, 84.50, 91.55, 91.65, 94.60, 94.69, 98.17, 98.22, 108.04, 112.36, 112.39, 121.86, 124.33.. HRMS (ESI) m/z calcd for C_9H_7FN $[M+H]^+$ 148.0557, found 148.0555.



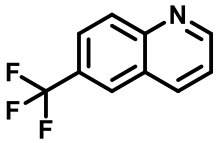
6-chloroquinoline(3i): The title compound was obtained by column chromatography (PE:EA =20:1) as yellow oil (49.9 mg) in 61 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.86 (d, *J* = 3.9 Hz, 1H), 8.00 (d, *J* = 8.7 Hz, 2H), 7.73 (d, *J* = 1.4 Hz, 1H), 7.61-7.58 (m, 1H), 7.38-7.34 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 150.64, 146.65, 135.16, 132.31, 131.14, 130.44, 128.85, 126.46, 121.95. HRMS (ESI) *m/z* calcd for $C_9H_7{}^{35.5}ClN$ $[M+H]^+$ 164.0262, found 164.0262.



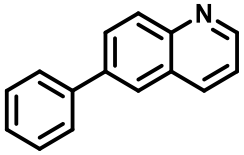
6-bromoquinoline(3j): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (57.2 mg) in 55 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.90 – 8.84 (m, 1H), 7.99 (d, *J* = 8.3 Hz, 1H), 7.95 – 7.89 (m, 2H), 7.72 (d, *J* = 9.0 Hz, 1H), 7.37-7.34 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 150.75, 146.81, 135.07, 132.96, 131.22, 129.82, 129.34, 121.91, 120.48. HRMS (ESI) *m/z* calcd for $C_9H_7{}^{79}BrN$ $[M+H]^+$ 207.9756, found 207.9755.



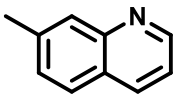
quinoline-6-carbonitrile(3k): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (50.9 mg) in 66 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.08 (s, 1H), 8.22-8.15 (m, 3H), 7.82 (d, *J* = 8.3 Hz, 1H), 7.53 (d, *J* = 4.7 Hz, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 153.18, 149.22, 136.41, 134.22, 131.14, 130.15, 127.74, 122.93, 118.54, 110.41. HRMS (ESI) *m/z* calcd for $C_{10}H_7N_2$ $[M+H]^+$ 155.0604, found 155.0605.



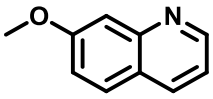
6-(trifluoromethyl)quinoline(3l): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (57.2 mg) in 58 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.07 – 9.00 (m, 1H), 8.28 – 8.19 (m, 2H), 8.14 (s, 1H), 7.89 (d, *J* = 8.8 Hz, 1H), 7.53-7.49 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 152.62 (s), 149.28 (s), 137.02 (s), 130.85 (s), 128.62 (q, *J* = 32.3 Hz), 127.34 (s), 125.94 (q, *J* = 4.3 Hz), 125.30 (q, *J* = 2.9 Hz), 124.09 (q, *J* = 270.5 Hz), 122.41 (s). HRMS (ESI) *m/z* calcd for $C_{10}H_7F_3N$ $[M+H]^+$198.0531, found 198.0533.



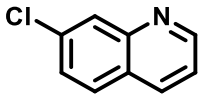
6-phenylquinoline(3m): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (72.9 mg) in 71 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.22-8.17 (m, 4H), 7.87 (d, *J* = 8.6 Hz, 1H), 7.83 (d, *J* = 8.1 Hz, 1H), 7.74 (t, *J* = 7.6 Hz, 1H), 7.59 – 7.44 (m, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.46, 148.37, 139.77, 136.89, 129.82, 129.77, 129.43, 128.95, 127.68, 127.57, 127.28, 126.38, 119.11. HRMS (ESI) *m/z* calcd for $C_{15}H_{12}N$ $[M+H]^+$ 206.0964, found 206.0971.



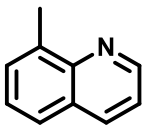
7-methylquinoline(3n): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (47.3 mg) in 66 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.85 (d, *J* = 4.0 Hz, 1H), 8.07 (d, *J* = 8.2 Hz, 1H), 7.87 (s, 1H), 7.67 (d, *J* = 8.3 Hz, 1H), 7.35 (d, *J* = 8.3 Hz, 1H), 7.31-7.27 (m, 1H), 2.54 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 150.41, 148.54, 139.80, 135.78, 128.86, 128.45, 127.48, 126.39, 120.34, 21.96. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}N$ $[M+H]^+$ 144.0808, found 144.0808.



7-methoxyquinoline(3o): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (48.6 mg) in 61 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.79 (s, 1H), 8.01 (d, *J* = 7.7 Hz, 1H), 7.63 (d, *J* = 8.8 Hz, 1H), 7.39 (s, 1H), 7.23 – 7.13 (m, 2H), 3.90 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 160.67, 150.56, 149.96, 135.70, 128.82, 123.54, 119.82, 119.00, 107.29, 55.50. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}NO$ $[M+H]^+$ 160.0757, found 160.0756.

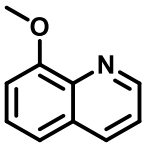


7-chloroquinoline(3p): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (49.1 mg) in 60 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.89 (d, *J* = 4.1 Hz, 1H), 8.10 (d, *J* = 12.3 Hz, 2H), 7.72 (d, *J* = 8.7 Hz, 1H), 7.47 (d, *J* = 8.7 Hz, 1H), 7.39-7.36 (m, 1H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 151.39, 148.56, 136.03, 135.40, 129.13, 128.47, 127.76, 126.69, 121.35. HRMS (ESI) *m/z* calcd for $C_9H_7{}^{35.5}ClN$ $[M+H]^+$ 164.0262, found 164.0263.

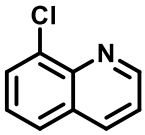


8-methylquinoline(3q): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (53.0 mg) in 74 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.97 – 8.92 (m, 1H), 8.11 (d, *J* = 8.2 Hz, 1H), 7.65 (d, *J* = 8.1 Hz, 1H), 7.56 (d, *J* = 6.9 Hz, 1H), 7.46 – 7.34 (m, 2H),

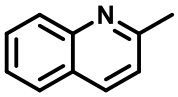
2.83 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 149.34, 147.44, 137.15, 136.42, 129.72, 128.35, 126.39, 125.97, 120.93, 18.28. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}N$ $[M+H]^+$ 144.0808, found 144.0809.



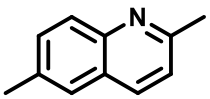
8-methoxyquinoline(3r): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (39.1 mg) in 49 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.86 (d, *J* = 4.1 Hz, 1H), 8.04 (d, *J* = 8.3 Hz, 1H), 7.41-7.29 (m, 3H), 6.98 (d, *J* = 7.6 Hz, 1H), 4.02 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 155.30, 149.17, 140.11, 135.85, 129.28, 126.67, 121.64, 119.50, 107.49, 55.91. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}NO$ $[M+H]^+$ 160.0757, found 160.0754.



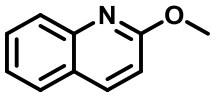
8-chloroquinoline(3s): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (43.2 mg) in 53 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 9.04 – 8.97 (m, 1H), 8.14 (d, *J* = 8.3 Hz, 1H), 7.80 (d, *J* = 7.5 Hz, 1H), 7.70 (d, *J* = 8.2 Hz, 1H), 7.46 – 7.39 (m, 2H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 151.05, 144.46, 136.61, 133.46, 129.67, 129.62, 127.06, 126.57, 121.99. HRMS (ESI) *m/z* calcd for $C_9H_7{}^{35.5}ClN$ $[M+H]^+$ 164.0262, found 164.0261.



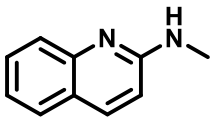
2-methylquinoline(3t): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (50.1 mg) in 70 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.04 (dd, *J* = 8.3, 4.8 Hz, 2H), 7.77 (d, *J* = 8.1 Hz, 1H), 7.69 (t, *J* = 7.7 Hz, 1H), 7.49 (t, *J* = 7.5 Hz, 1H), 7.28 (d, *J* = 8.4 Hz, 1H), 2.76 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 159.04, 147.91, 136.22, 129.48, 128.68, 127.55, 126.53, 125.72, 122.05, 25.46. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}N$ $[M+H]^+$ 144.0808, found 144.0810.



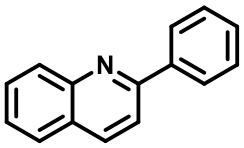
2-ethylquinoline(3u): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (54.2 mg) in 69 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.85 (d, *J* = 8.5 Hz, 1H), 7.77 (d, *J* = 8.4 Hz, 1H), 7.43 – 7.32 (m, 2H), 7.08 (d, *J* = 8.4 Hz, 1H), 2.62 (s, 3H), 2.38 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.73, 146.27, 135.32, 135.12, 131.43, 128.14, 126.30, 126.23, 121.74, 25.09, 21.27. HRMS (ESI) *m/z* calcd for $C_{11}H_{12}N$ $[M+H]^+$ 158.0964, found 158.0964.



2-methoxyquinoline(3v): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (53.3 mg) in 67 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.96 (d, *J* = 8.8 Hz, 1H), 7.88 (d, *J* = 8.4 Hz, 1H), 7.71 (d, *J* = 8.0 Hz, 1H), 7.63 (t, *J* = 7.7 Hz, 1H), 7.38 (t, *J* = 7.5 Hz, 1H), 6.91 (d, *J* = 8.8 Hz, 1H), 4.10 (s, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 162.51, 146.69, 138.76, 129.58, 127.54, 127.33, 125.18, 124.08, 113.17, 53.48. HRMS (ESI) *m/z* calcd for $C_{10}H_{10}NO$ $[M+H]^+$ 160.0757, found 160.0726.



N-methylquinolin-2-amine(3w): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (44.3 mg) in 56 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.80 (d, *J* = 8.9 Hz, 1H), 7.71 (d, *J* = 8.4 Hz, 1H), 7.59 – 7.50 (m, 2H), 7.20 (t, *J* = 7.4 Hz, 1H), 6.62 (d, *J* = 8.9 Hz, 1H), 4.89 (s, 1H), 3.07 (d, *J* = 3.6 Hz, 3H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.77, 148.15, 137.34, 129.64, 127.56, 126.11, 123.42, 122.05, 111.31, 28.78. HRMS (ESI) *m/z* calcd for $C_{10}H_{11}N_2$ $[M+H]^+$ 159.0917, found 159.0919.

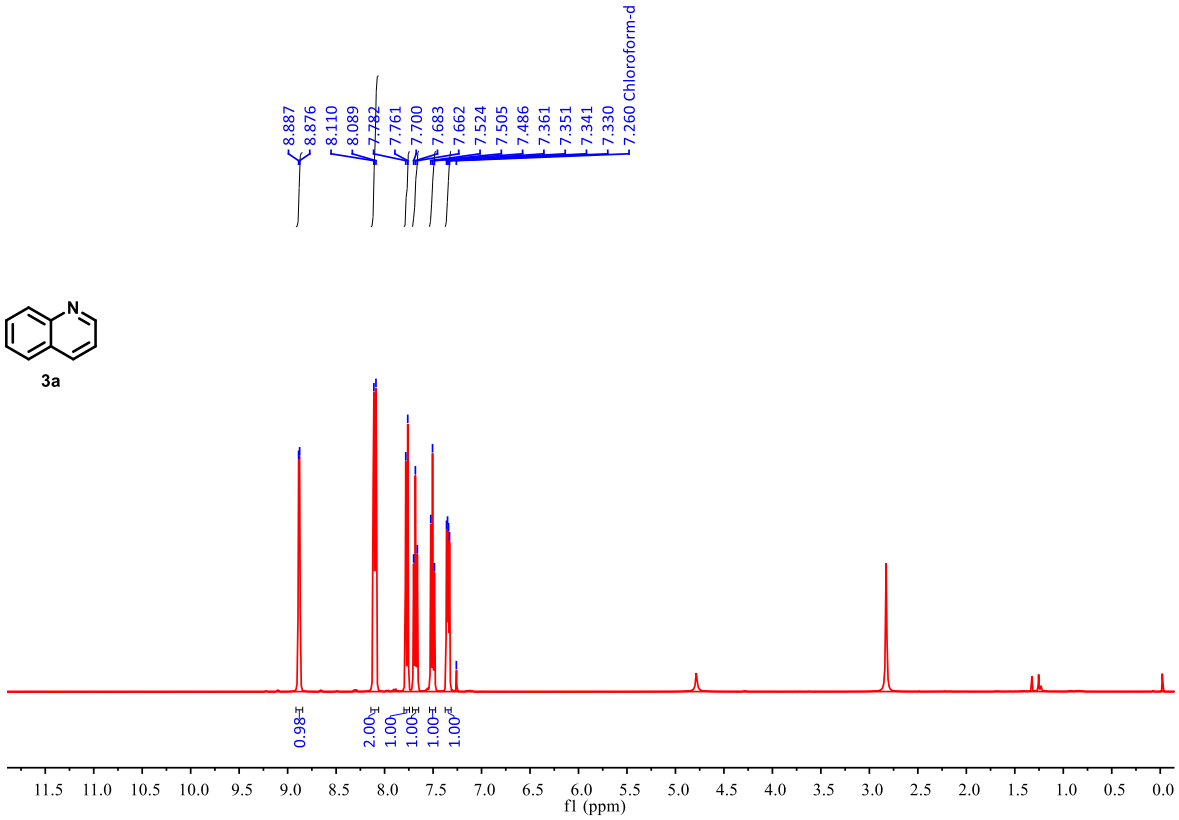


2-phenylquinoline(3x): The title compound was obtained by column chromatography (PE:EA = 20:1) as yellow oil (48.2 mg) in 47 % yield according to the Method A. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.26 – 8.15 (m, 4H), 7.87-7.80 (m, 2H), 7.75 (t, *J* = 7.7 Hz, 1H), 7.59 – 7.45 (m, 4H). ^{13}C NMR (101 MHz, $CDCl_3$) δ 157.38, 148.31, 139.71, 136.83, 129.76, 129.72, 129.39, 128.90, 127.64, 127.53, 127.22, 126.33, 119.05. HRMS (ESI) *m/z* calcd for $C_{15}H_{12}N$ $[M+H]^+$ 206.0964, found 206.0976.

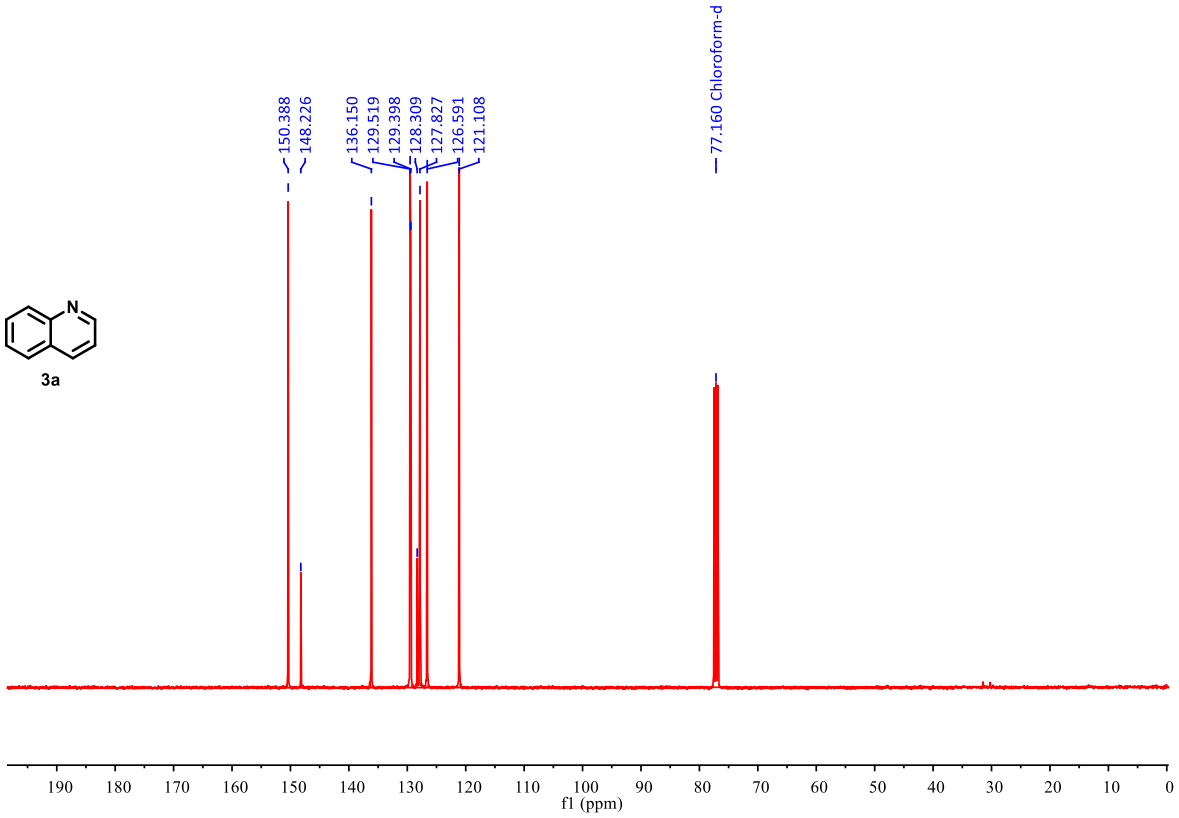
4. Copies of ^{1}H and ^{13}C NMR

quinoline(5a):

^{1}H NMR, 400 MHz, $CDCl_3$

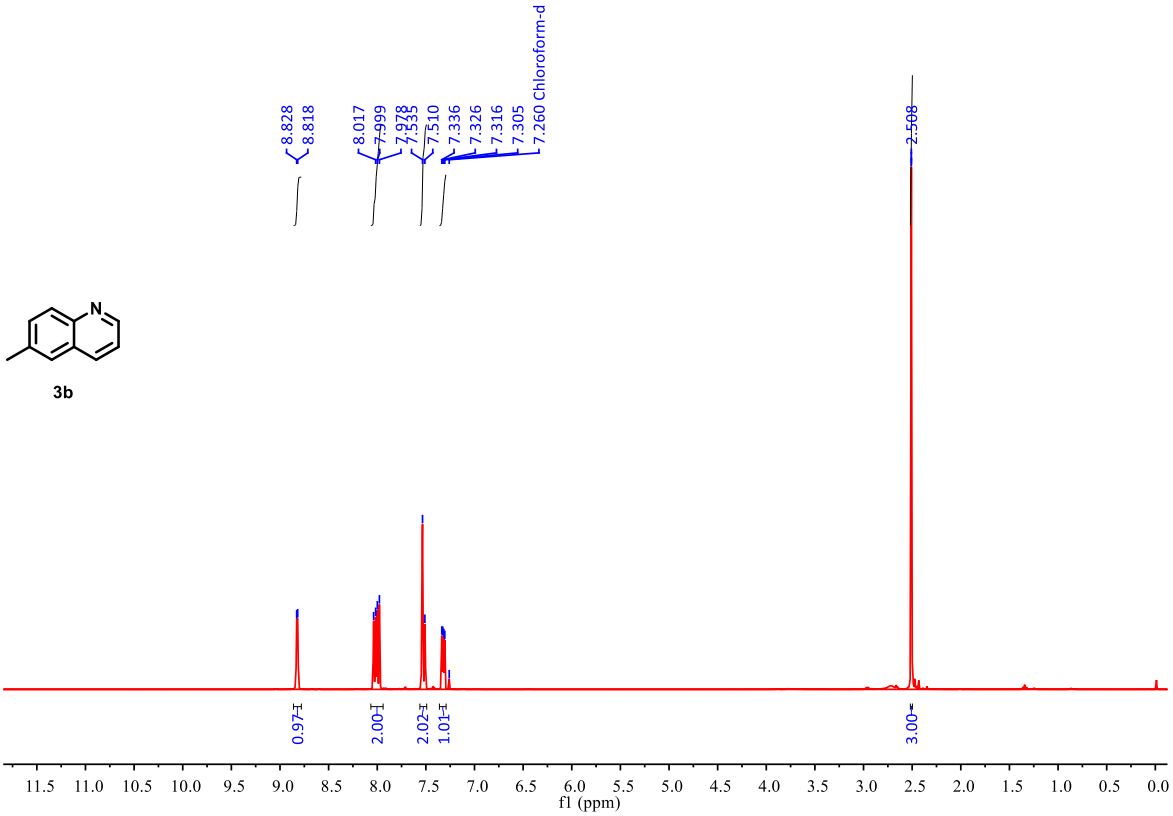


^{13}C NMR, 101 MHz, $CDCl_3$

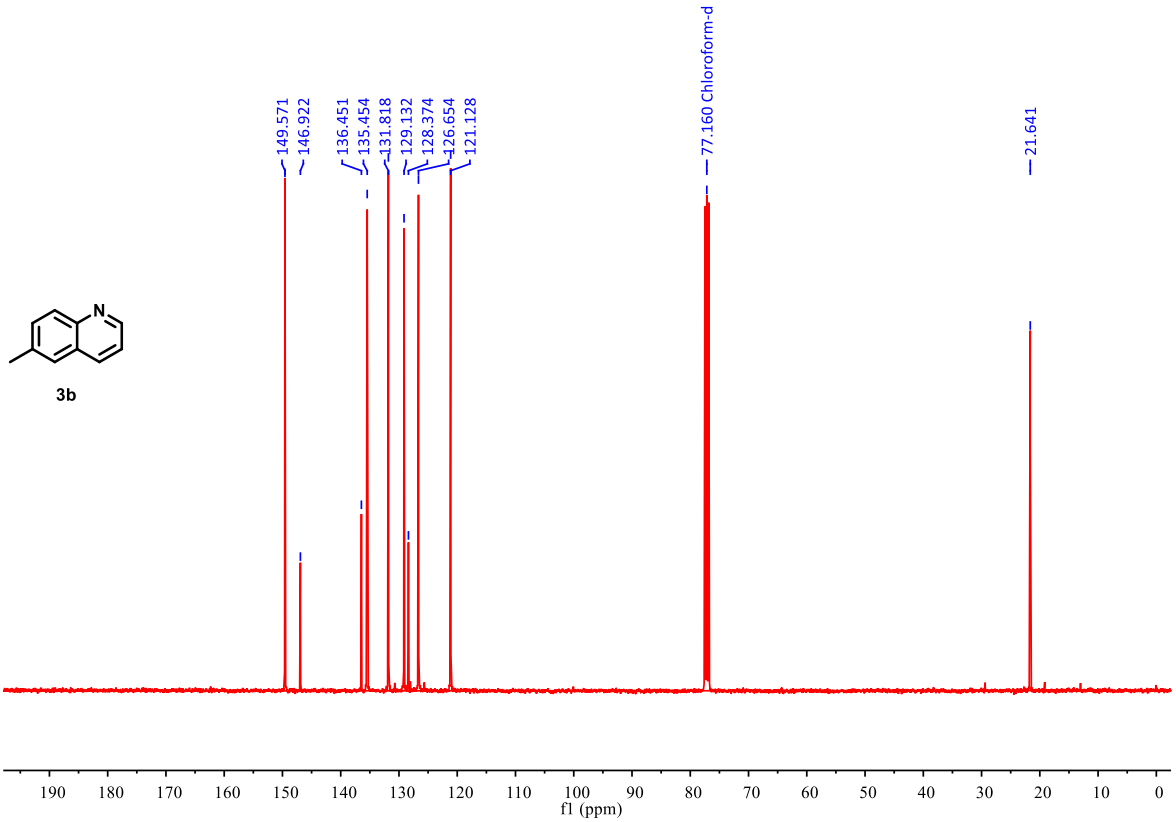


6-methylquinoline(3b):

^{1}H NMR, 400 MHz, $CDCl_3$

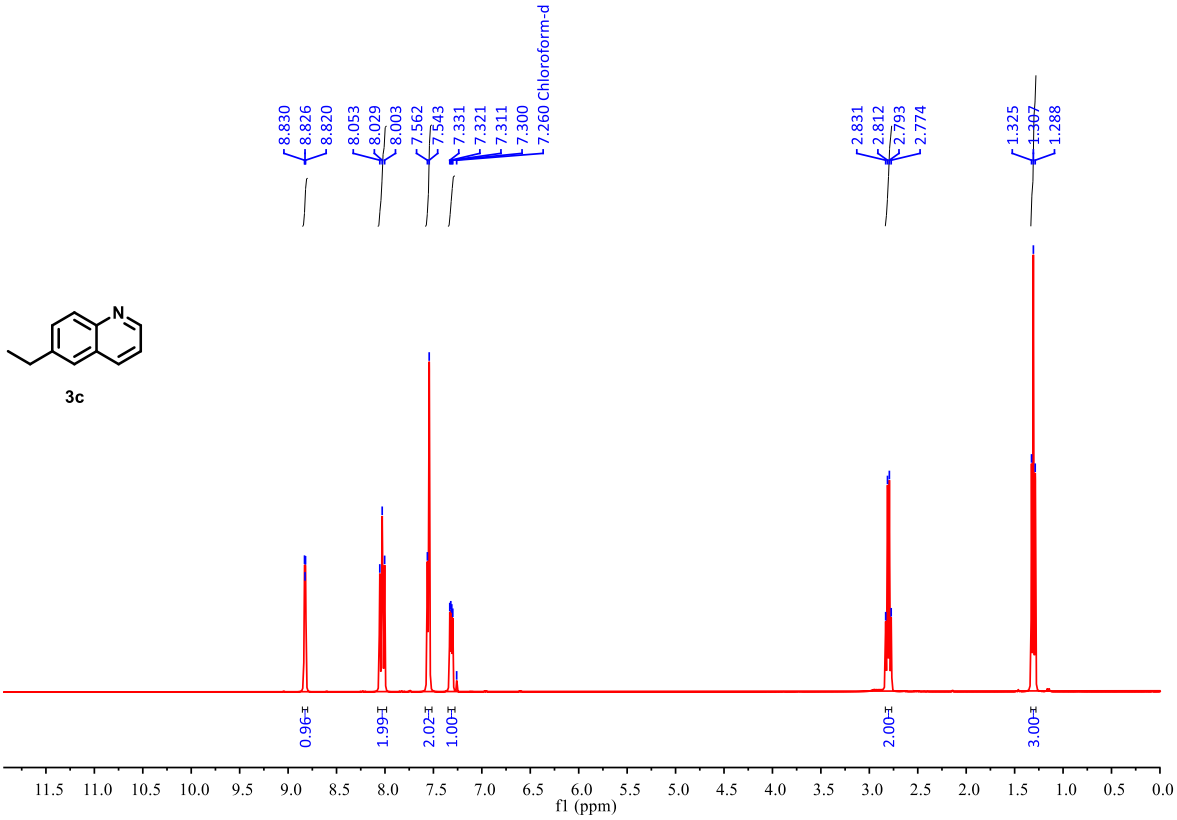


^{13}C NMR, 101 MHz, $CDCl_3$



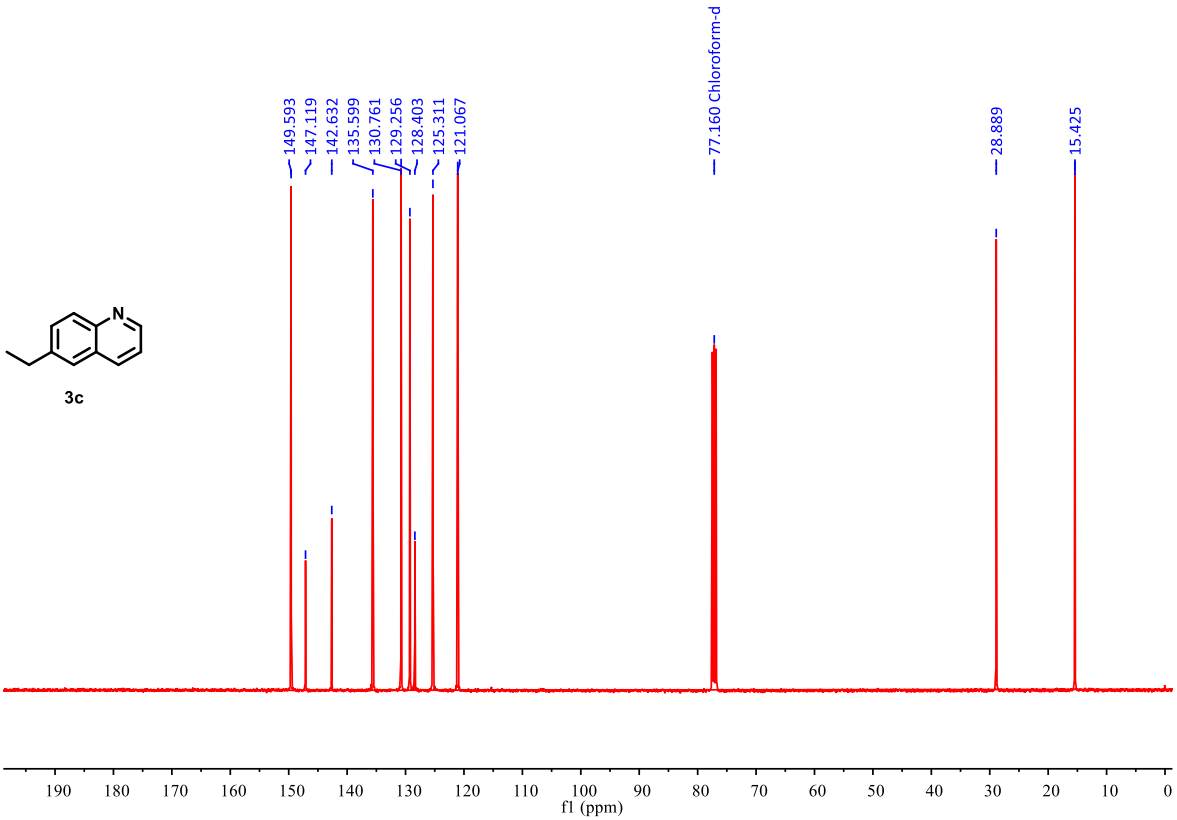
6-ethylquinoline(3c):

^{1}H NMR, 400 MHz, $CDCl_3$



3c

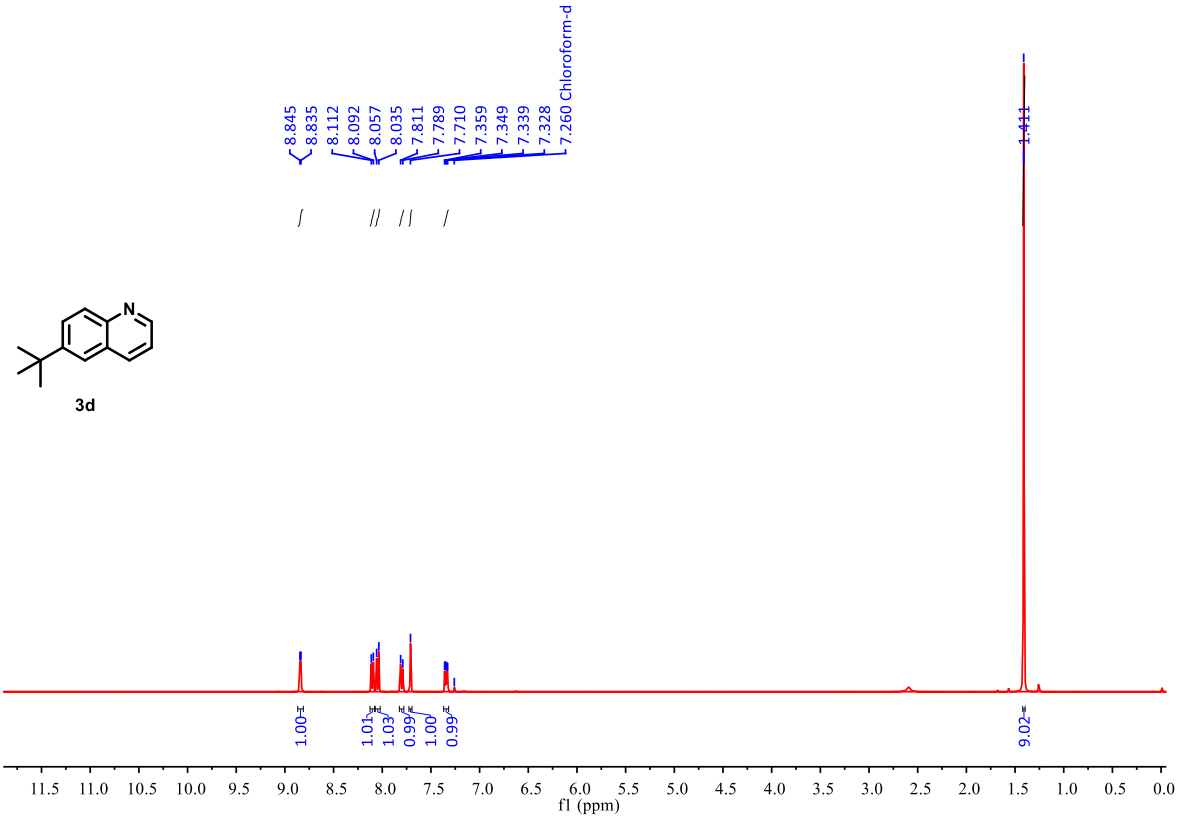
^{13}C NMR, 101 MHz, $CDCl_3$



3c

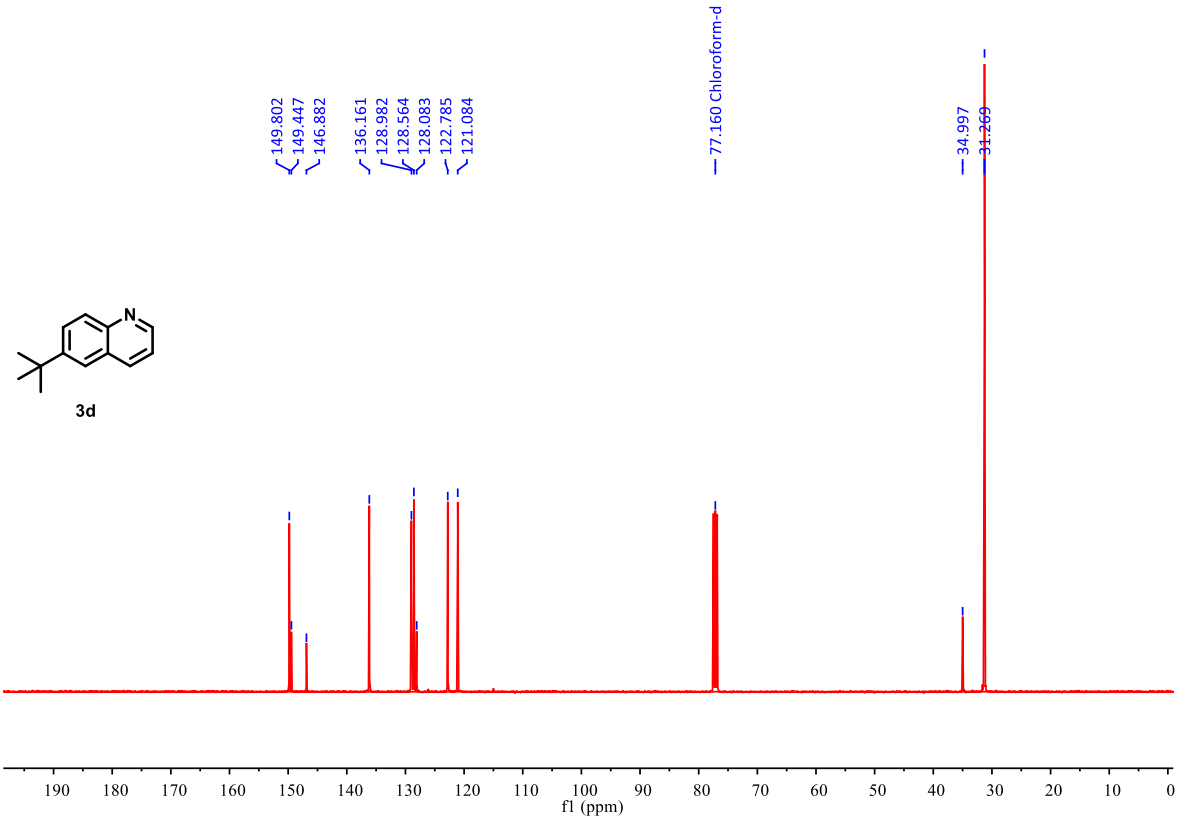
6-(tert-butyl)quinoline(3d):

^{1}H NMR, 400 MHz, $CDCl_3$



3d

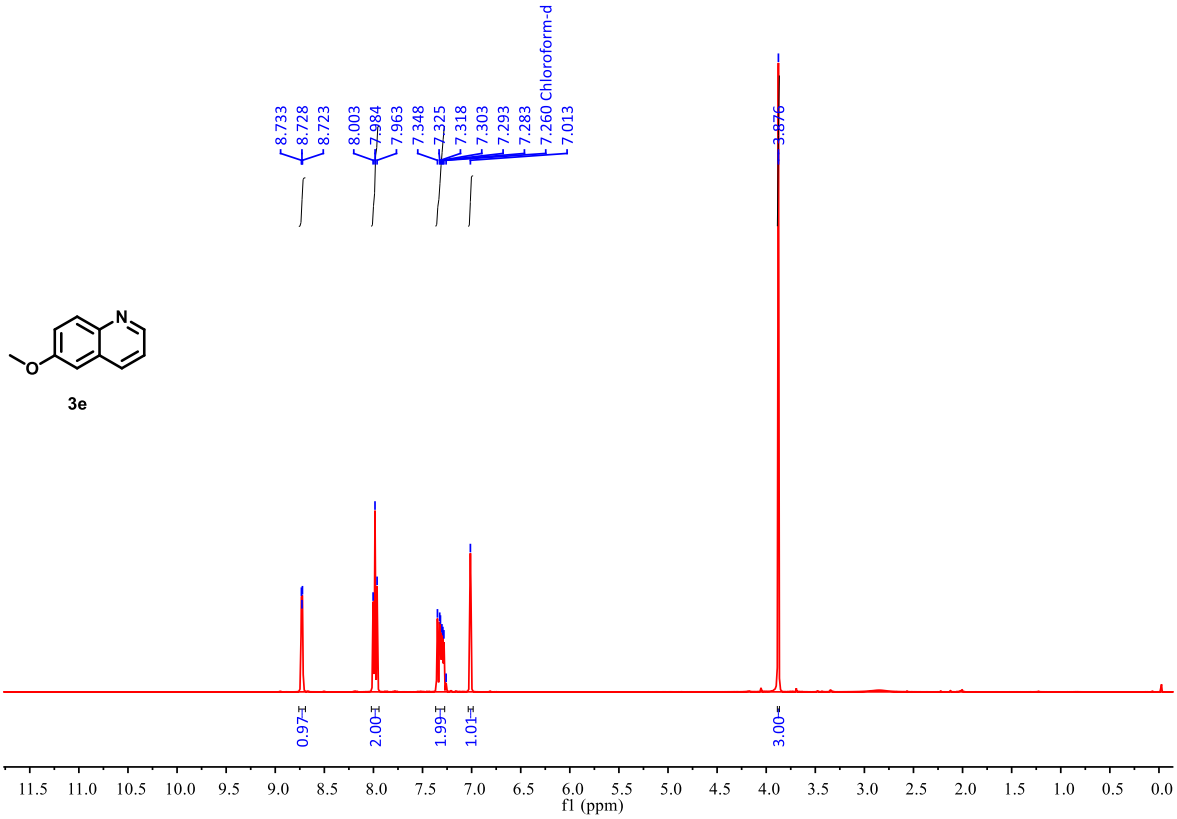
^{13}C NMR, 101 MHz, $CDCl_3$



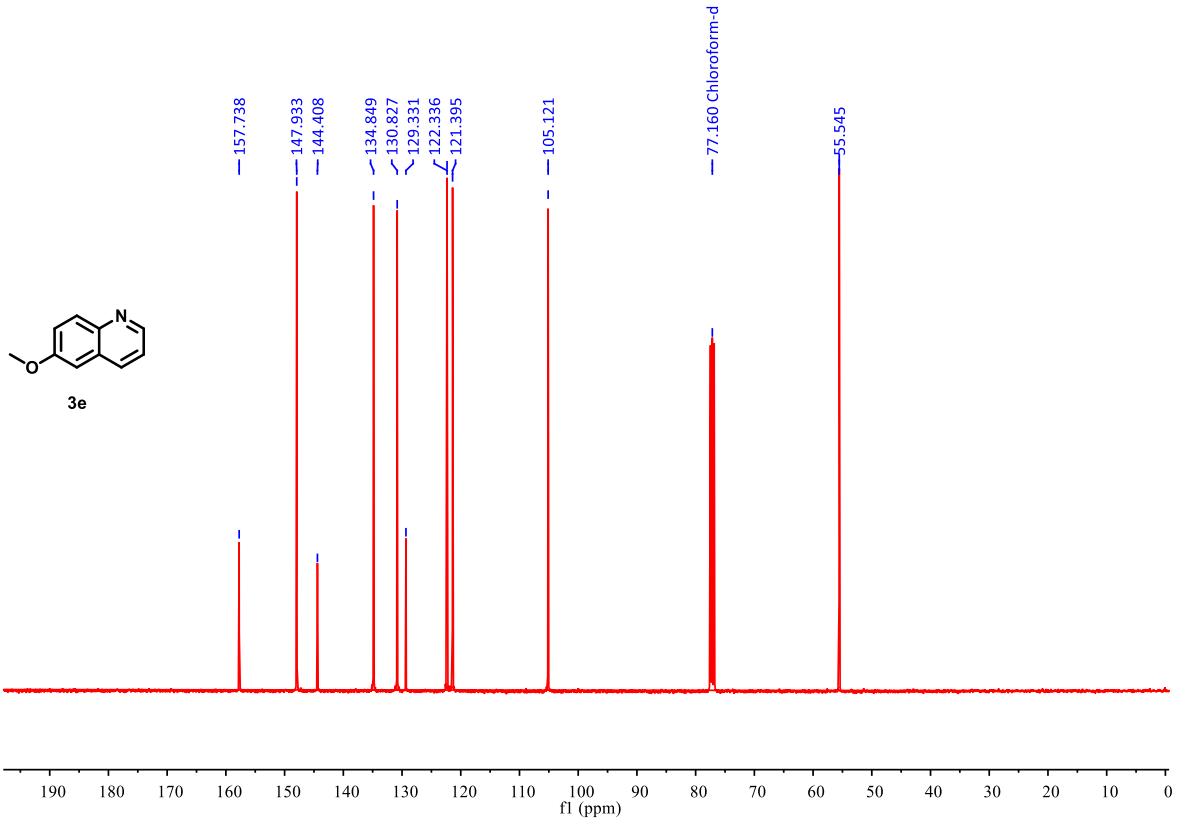
3d

6-methoxyquinoline(3e):

^{1}H NMR, 400 MHz, $CDCl_3$

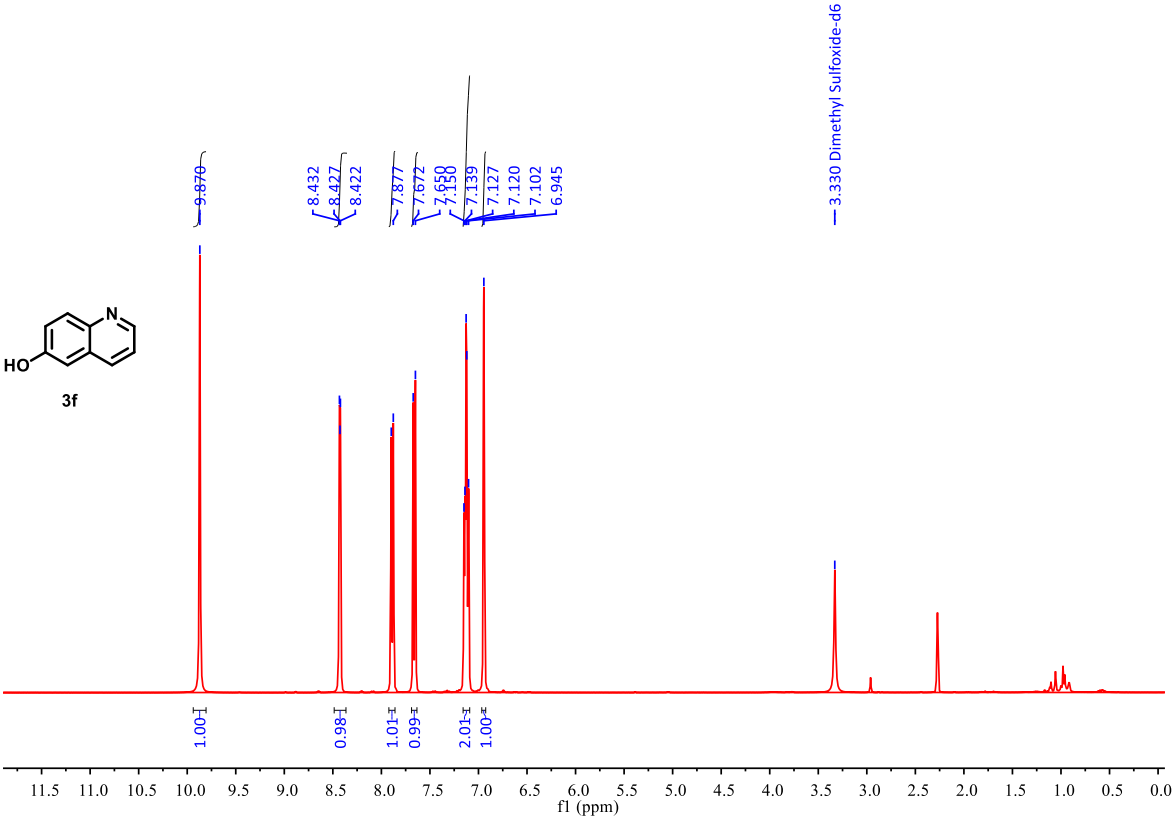


^{13}C NMR, 101 MHz, $CDCl_3$



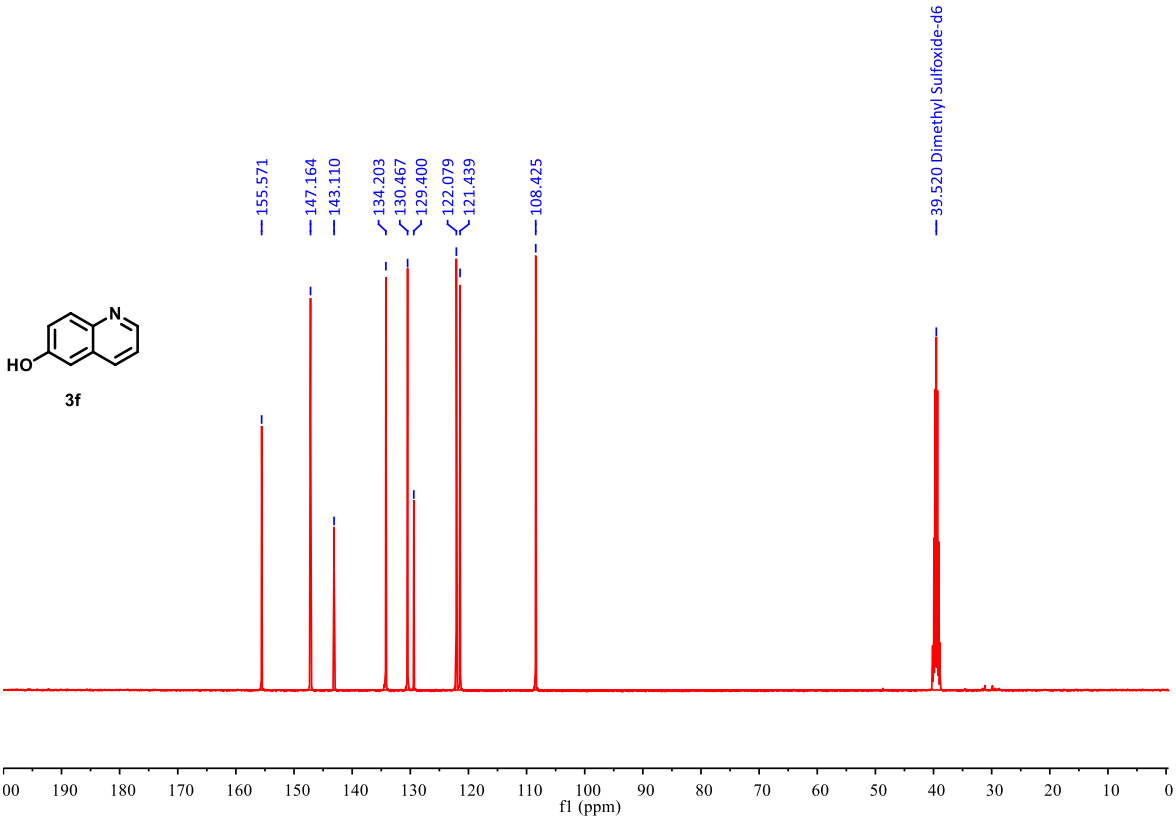
quinolin-6-ol(3f):

^{1}H NMR, 400 MHz, $CDCl_3$



3f

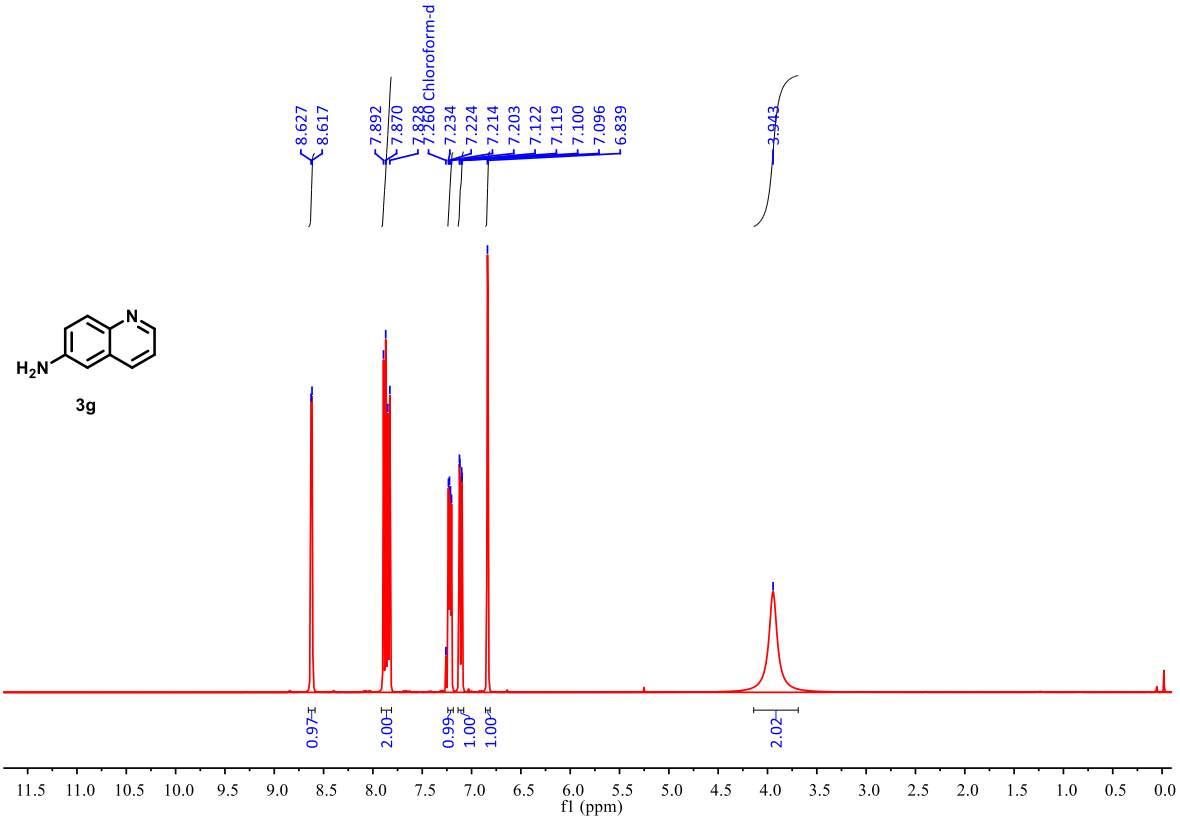
^{13}C NMR, 101 MHz, $CDCl_3$



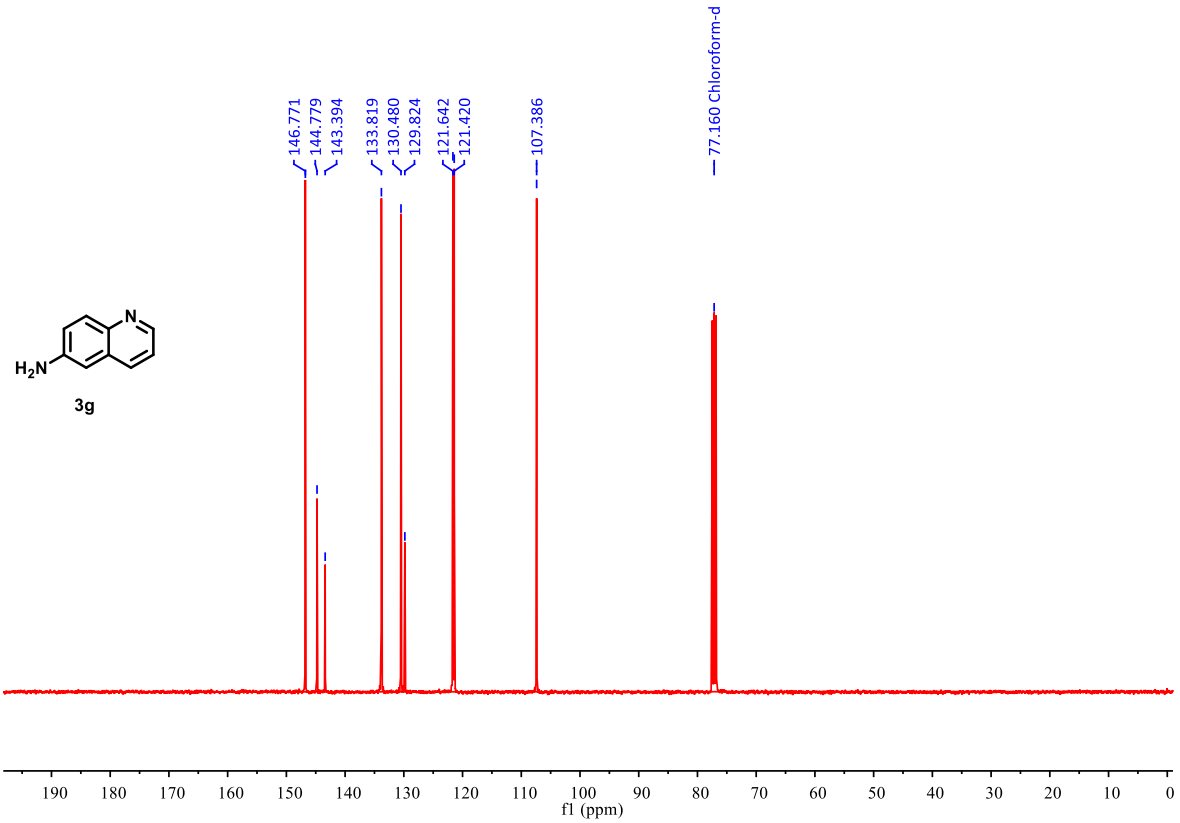
3f

quinolin-6-amine(3g):

^{1}H NMR, 400 MHz, $CDCl_3$

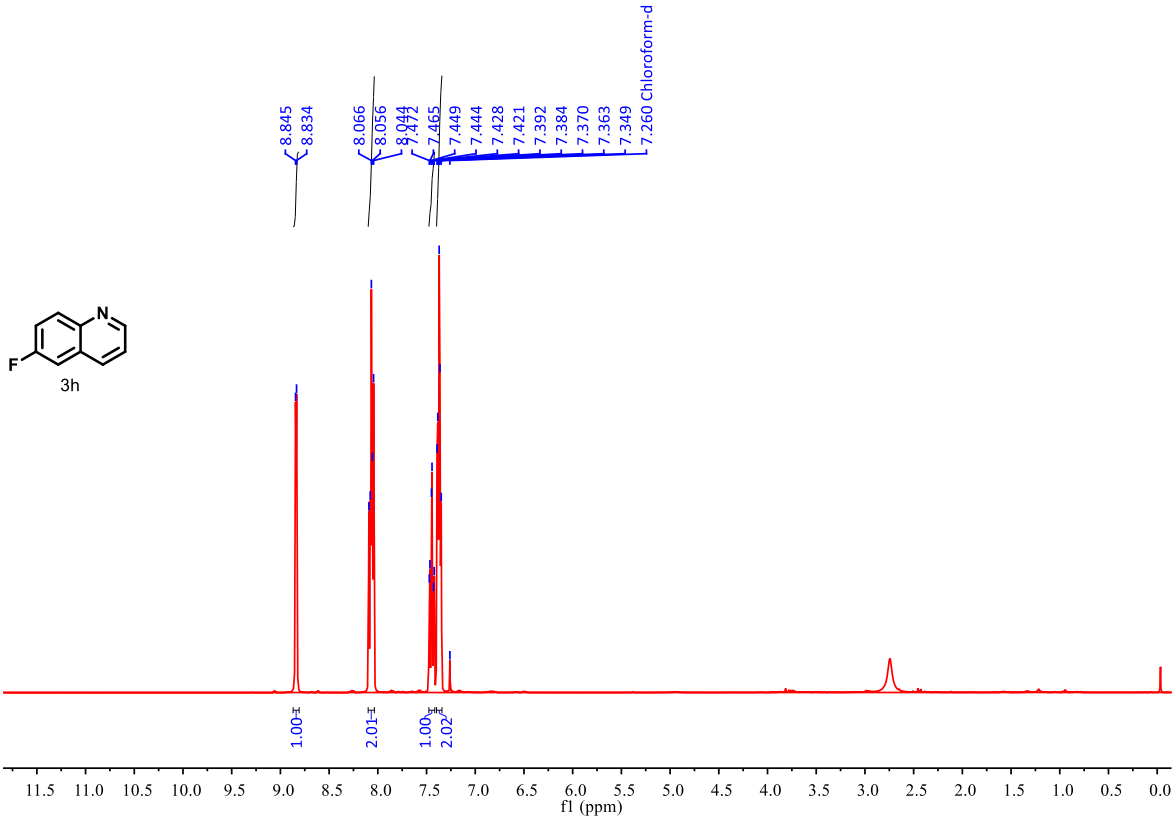


^{13}C NMR, 101 MHz, $CDCl_3$

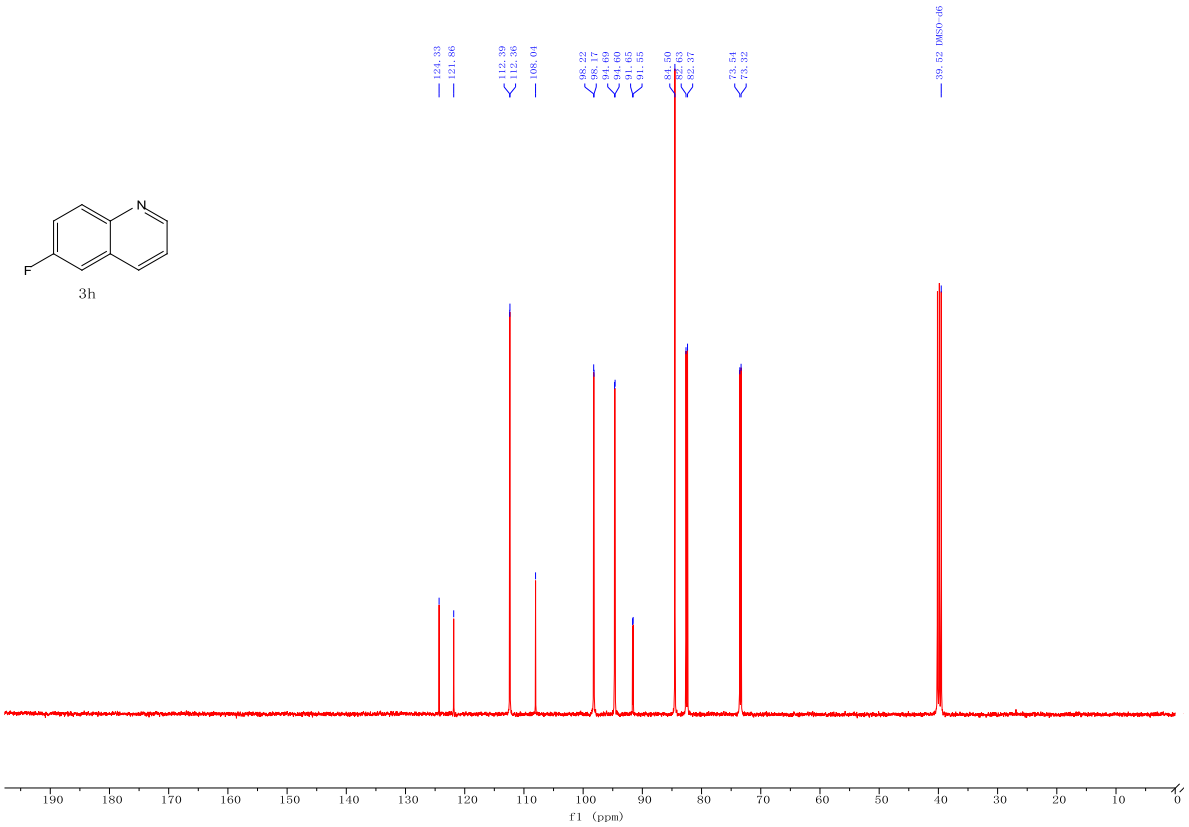


6-fluoroquinoline(3h):

^{1}H NMR, 400 MHz, $CDCl_3$

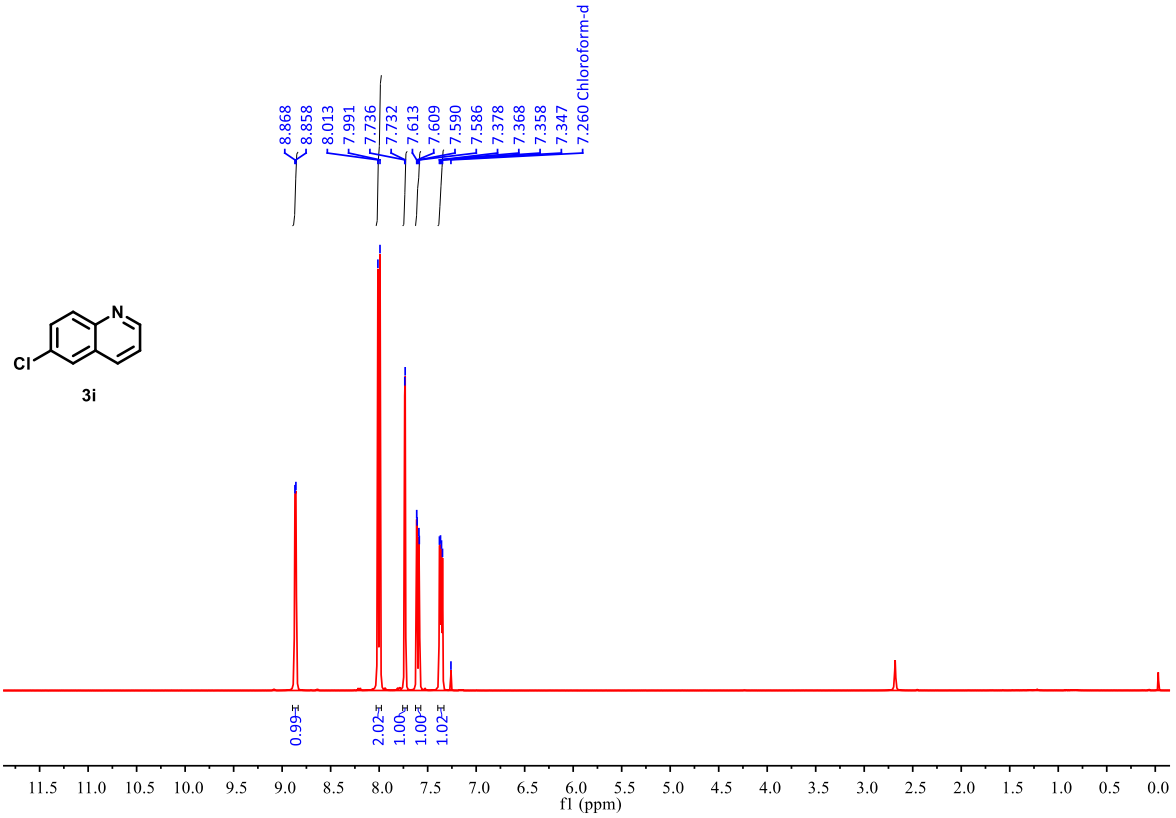


^{13}C NMR, 101 MHz, $CDCl_3$

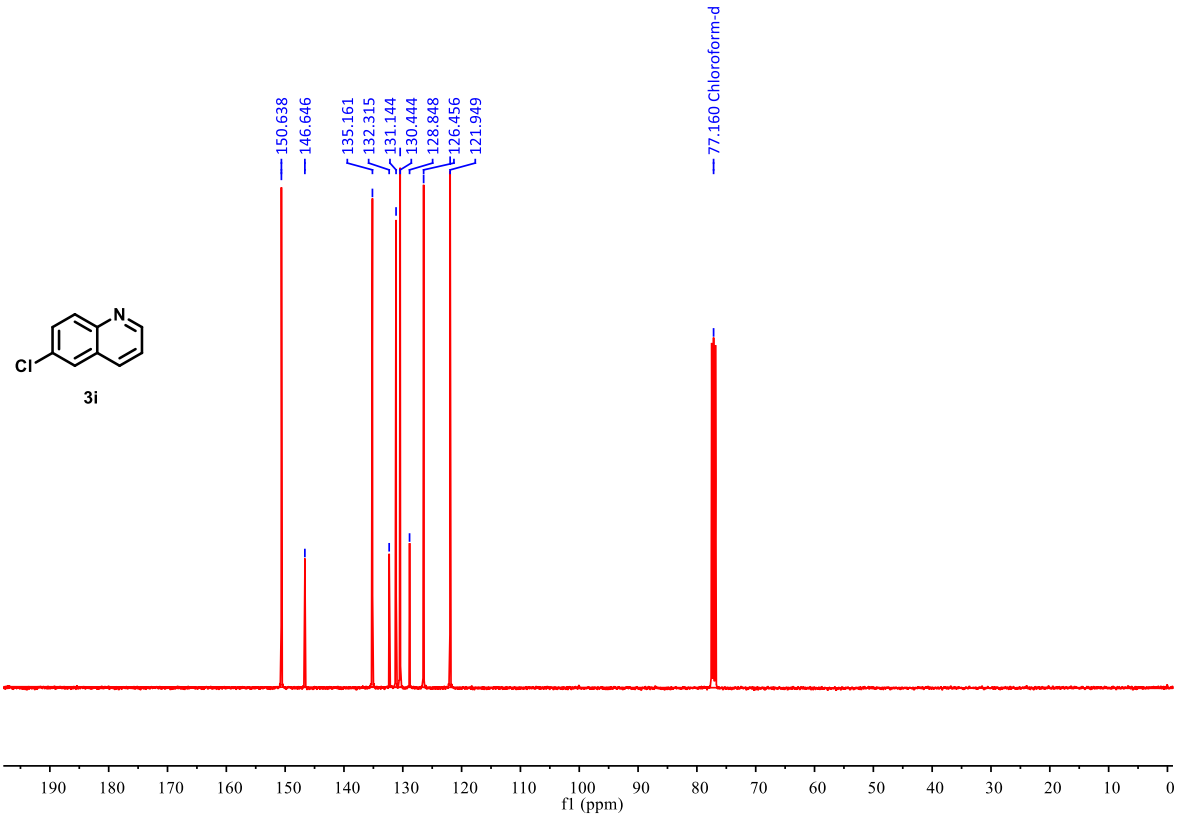


6-chloroquinoline(3i):

^{1}H NMR, 400 MHz, $CDCl_3$

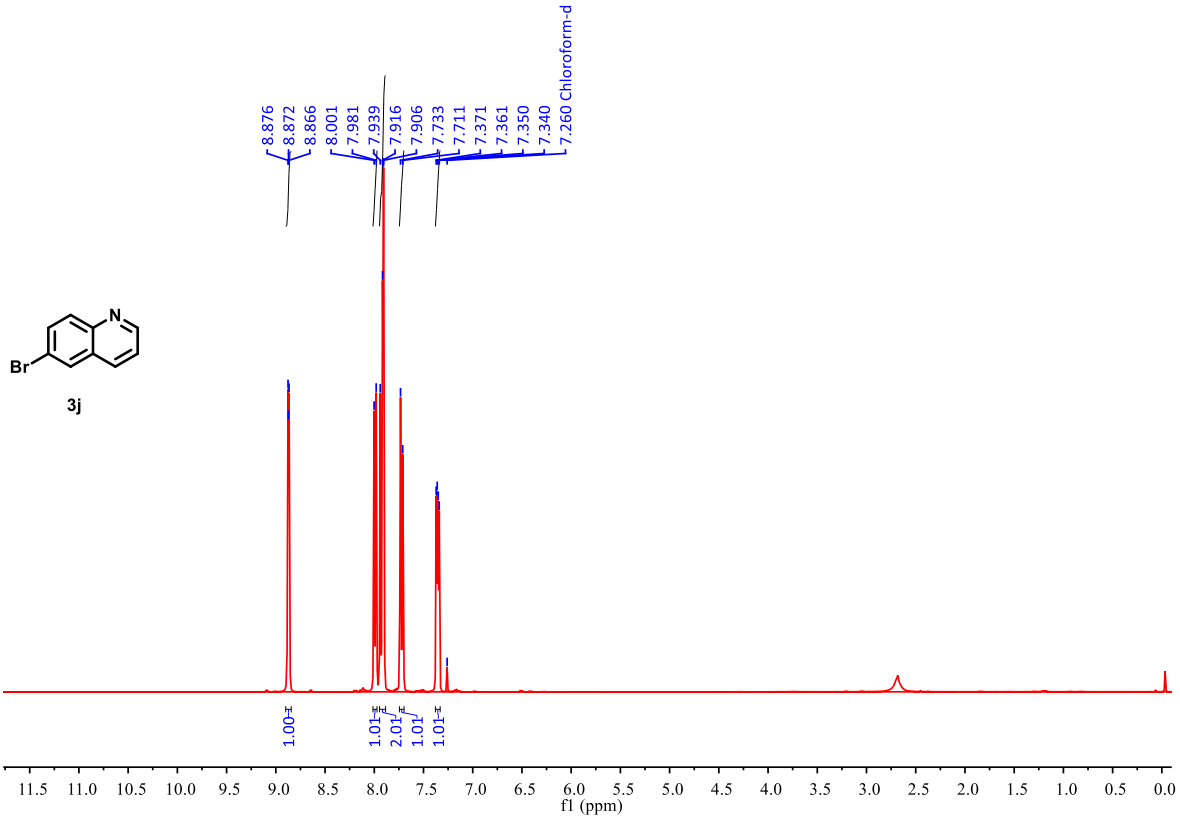


^{13}C NMR, 101 MHz, $CDCl_3$



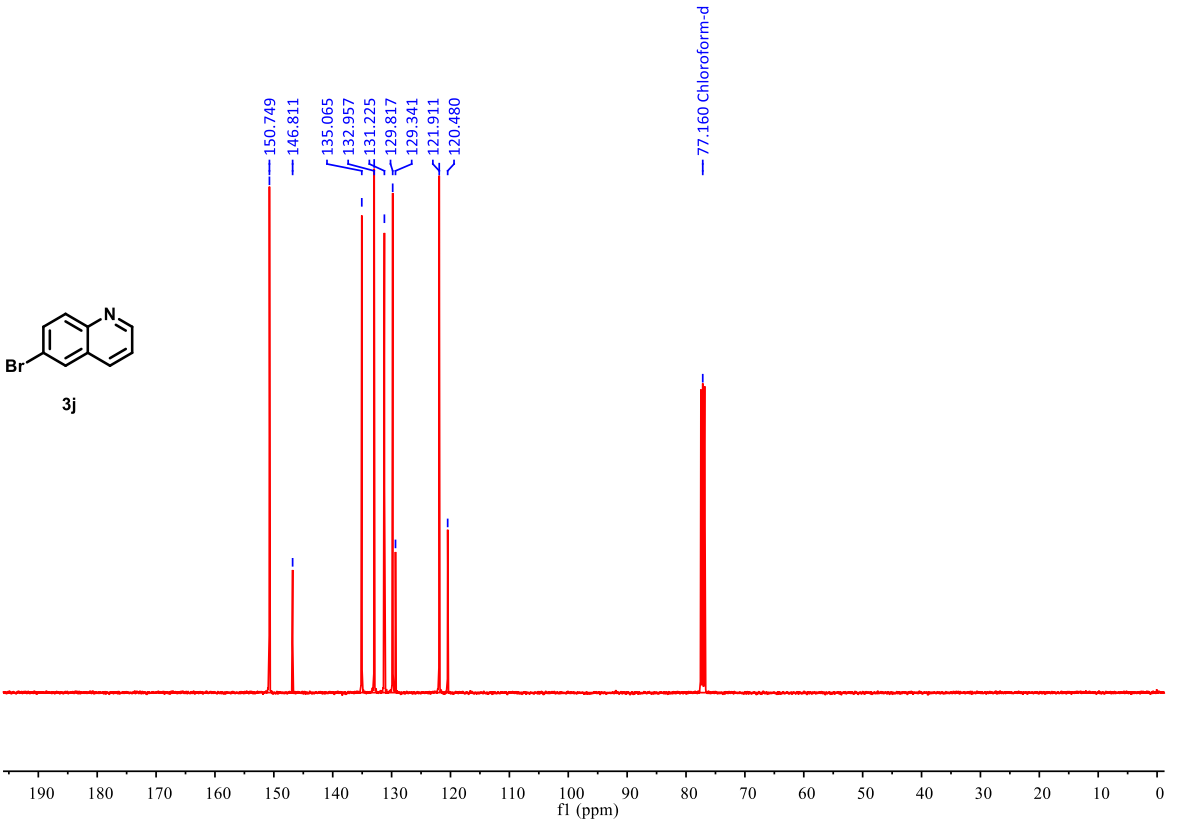
6-bromoquinoline(3j):

^{1}H NMR, 400 MHz, $CDCl_3$



3j

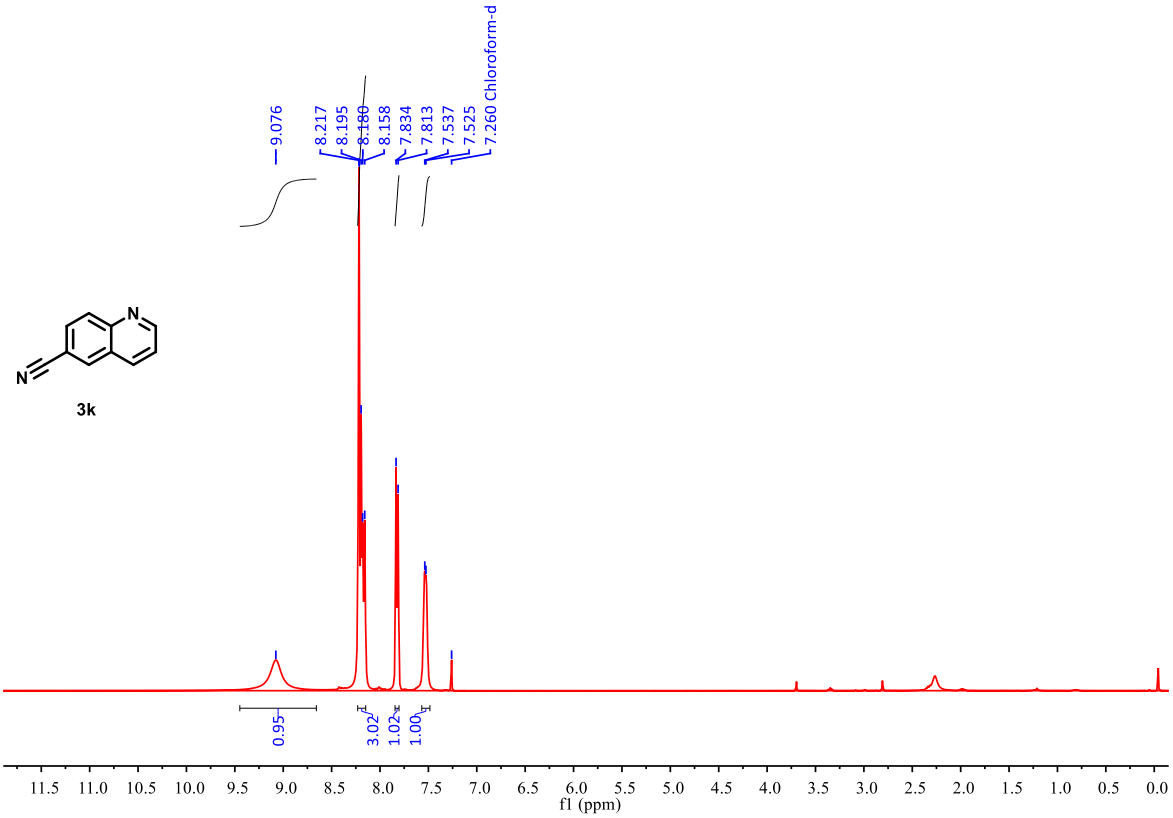
^{13}C NMR, 101 MHz, $CDCl_3$



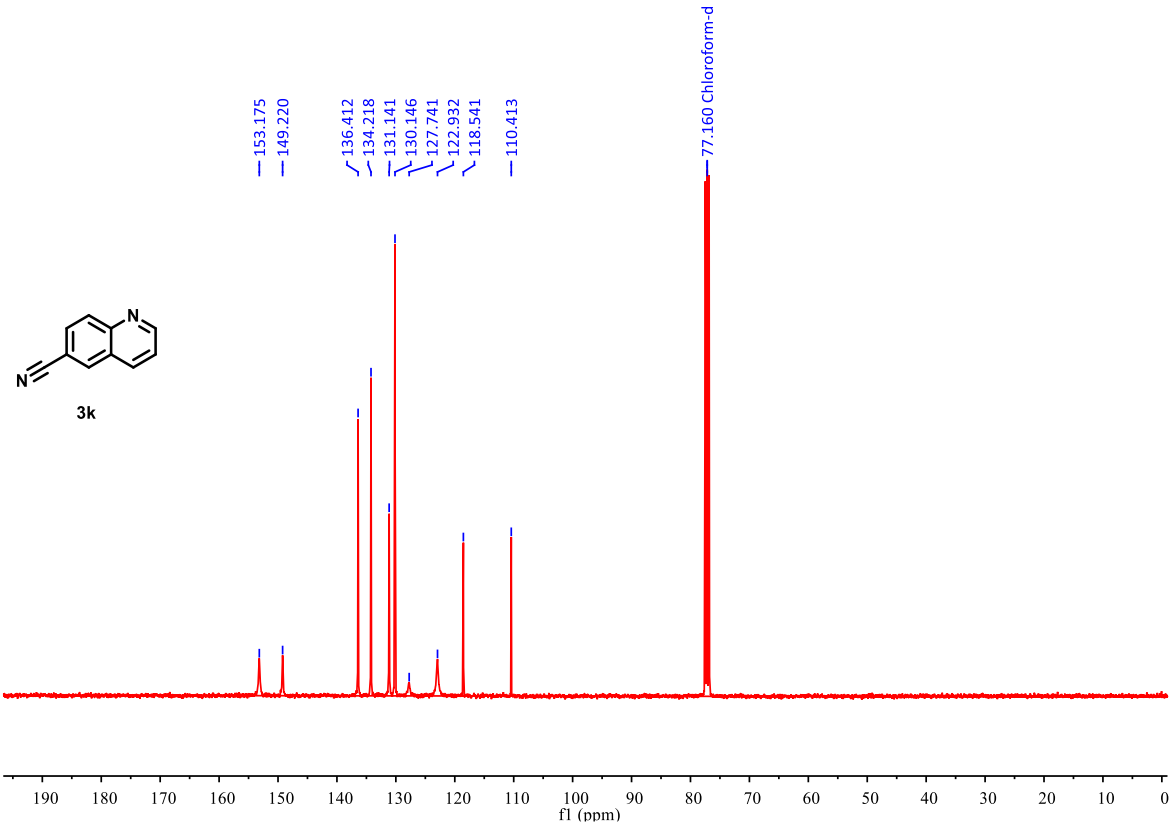
3j

quinoline-6-carbonitrile(3k):

^{1}H NMR, 400 MHz, $CDCl_3$

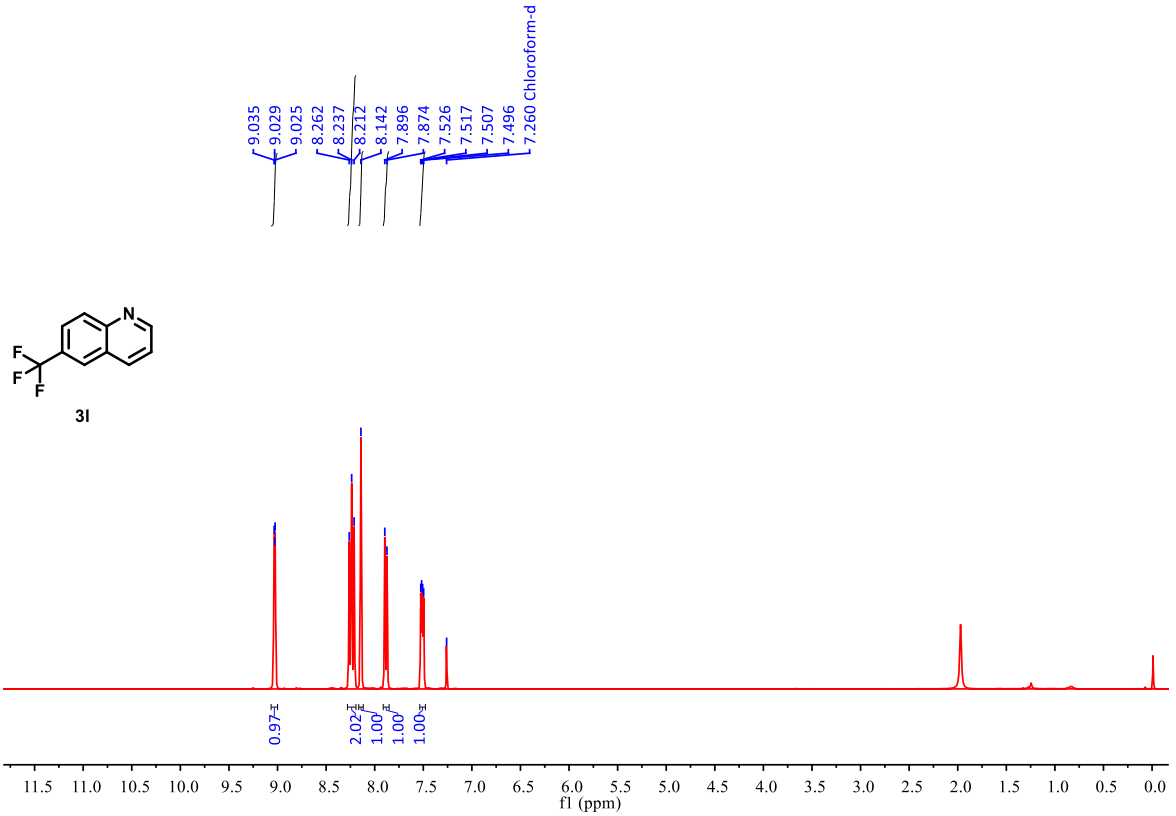


^{13}C NMR, 101 MHz, $CDCl_3$

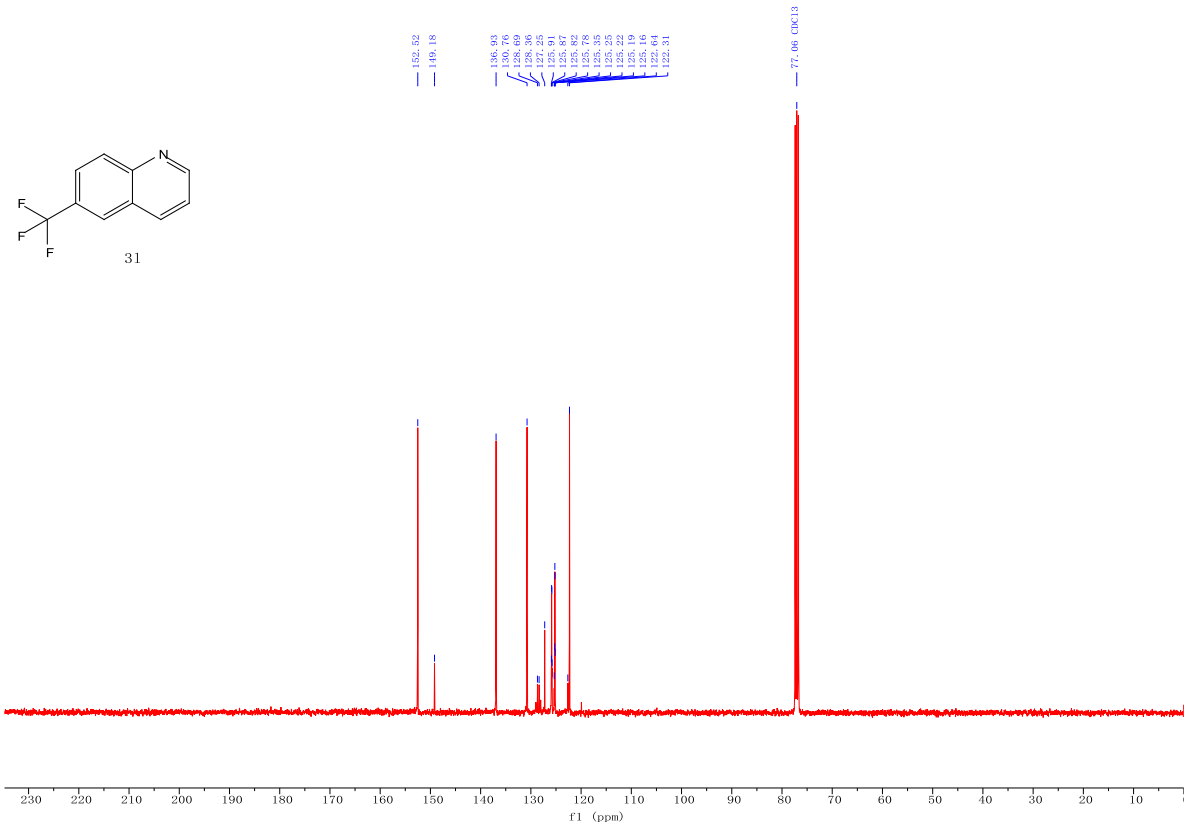


6-(trifluoromethyl)quinoline(3l):

^{1}H NMR, 400 MHz, $CDCl_3$

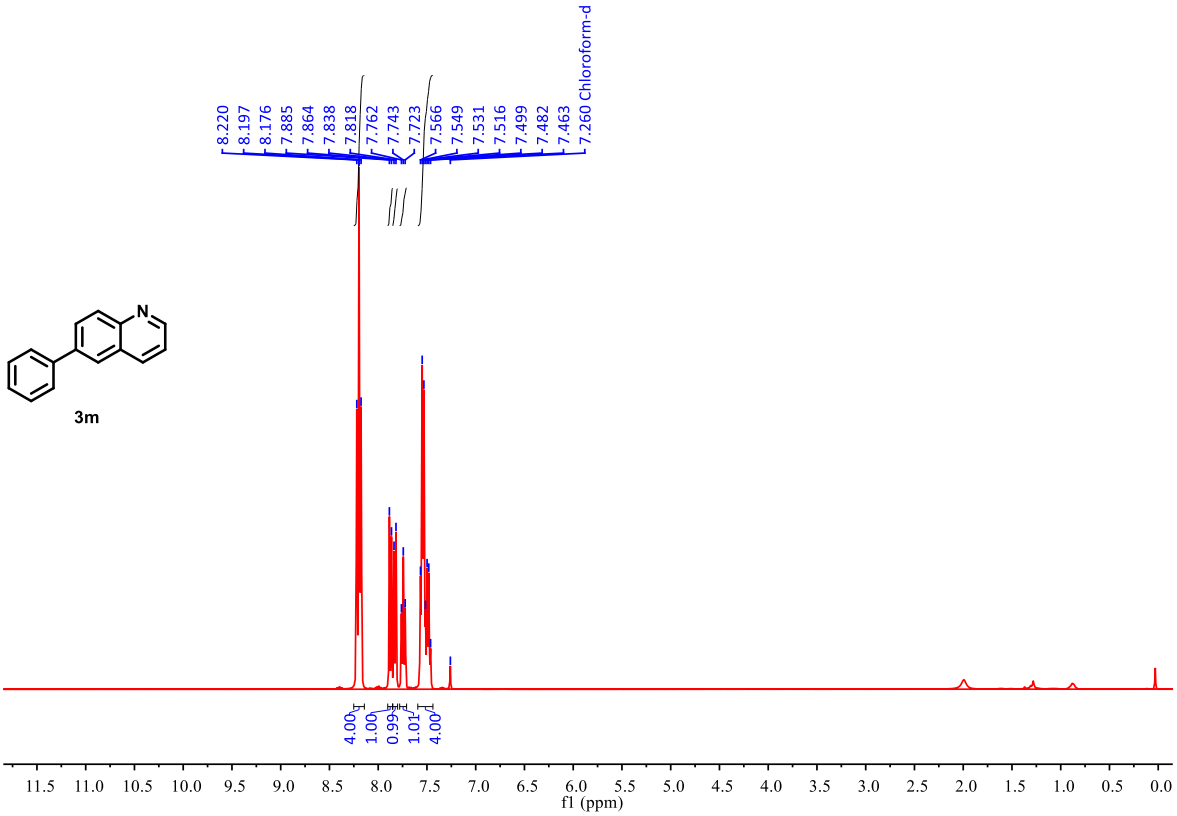


^{13}C NMR, 101 MHz, $CDCl_3$

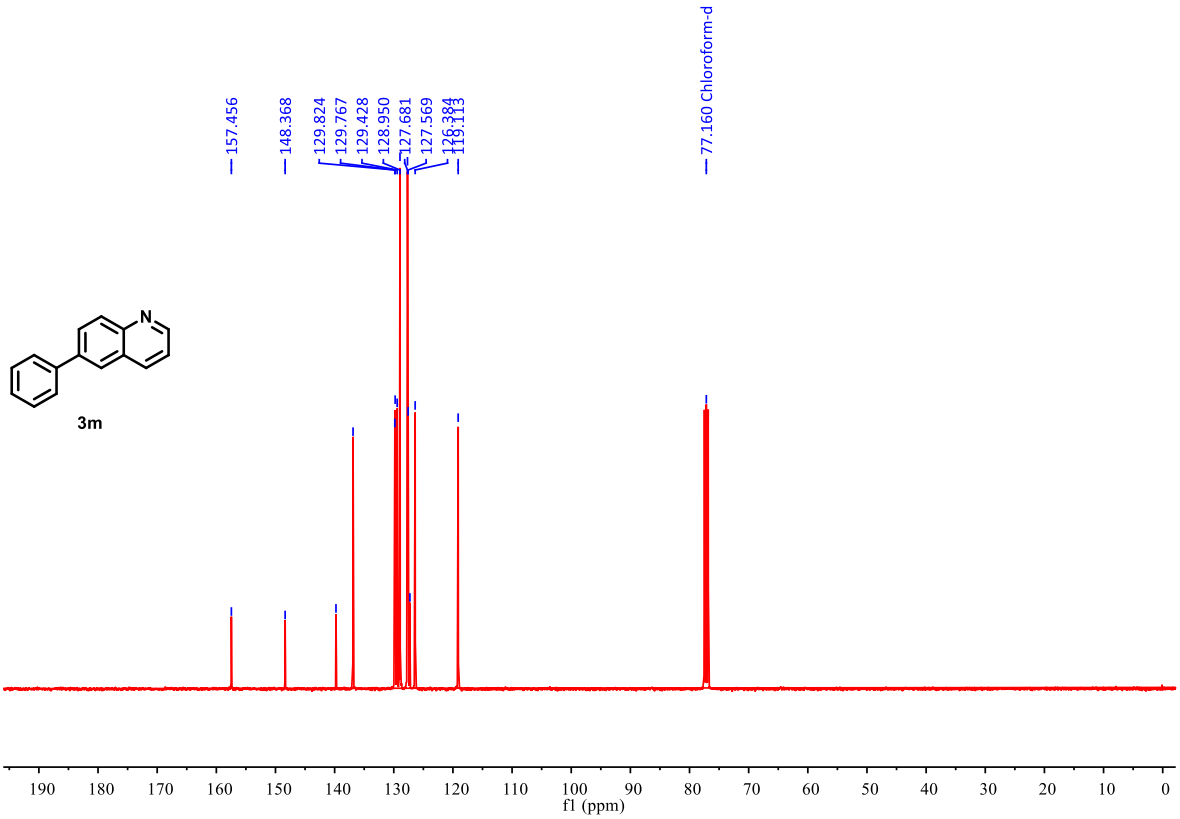


6-phenylquinoline(3m):

^{1}H NMR, 400 MHz, $CDCl_3$

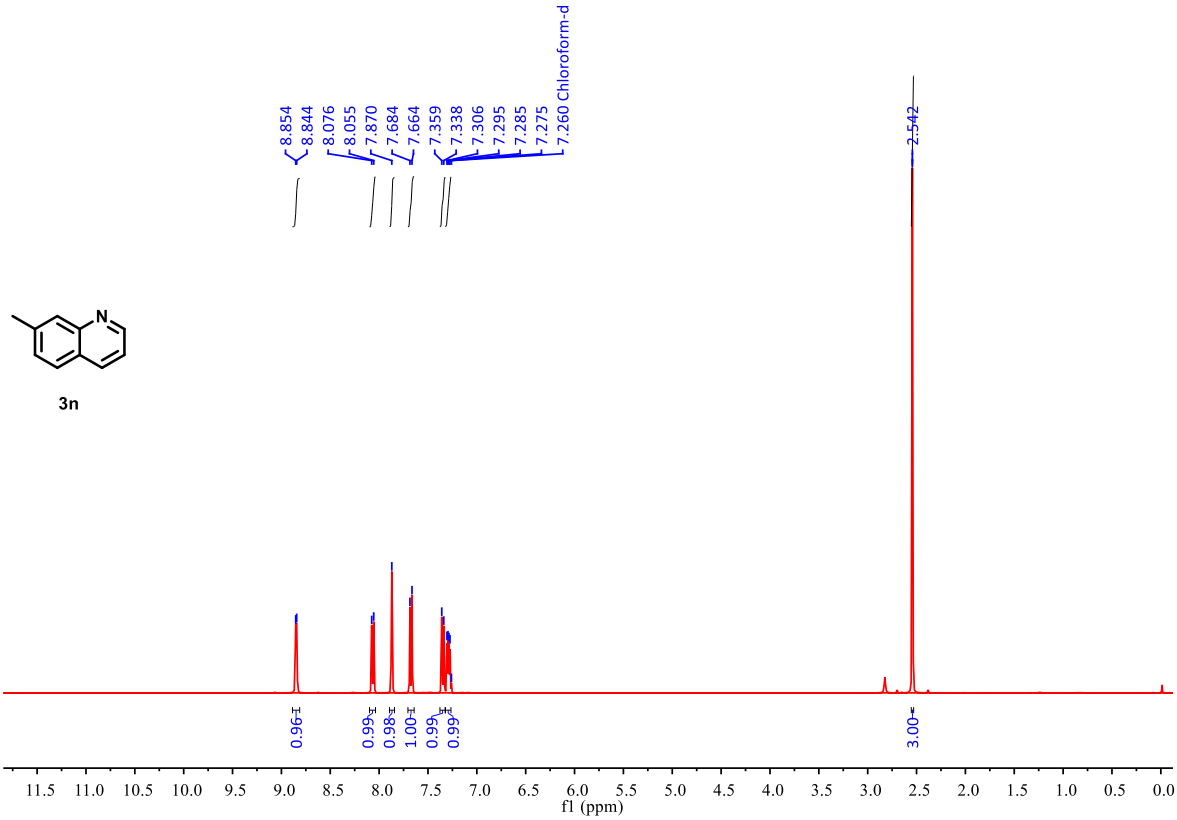


^{13}C NMR, 101 MHz, $CDCl_3$



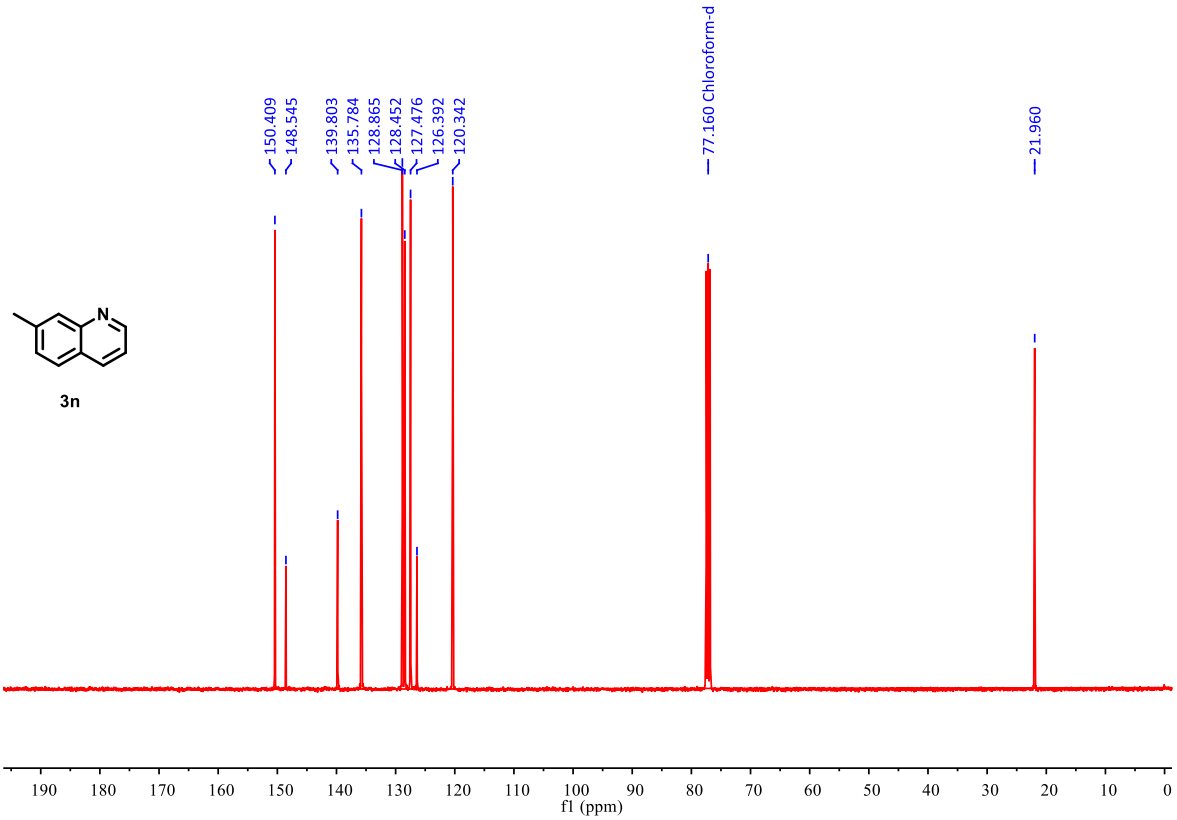
7-methylquinoline(3n):

^{1}H NMR, 400 MHz, $CDCl_3$



3n

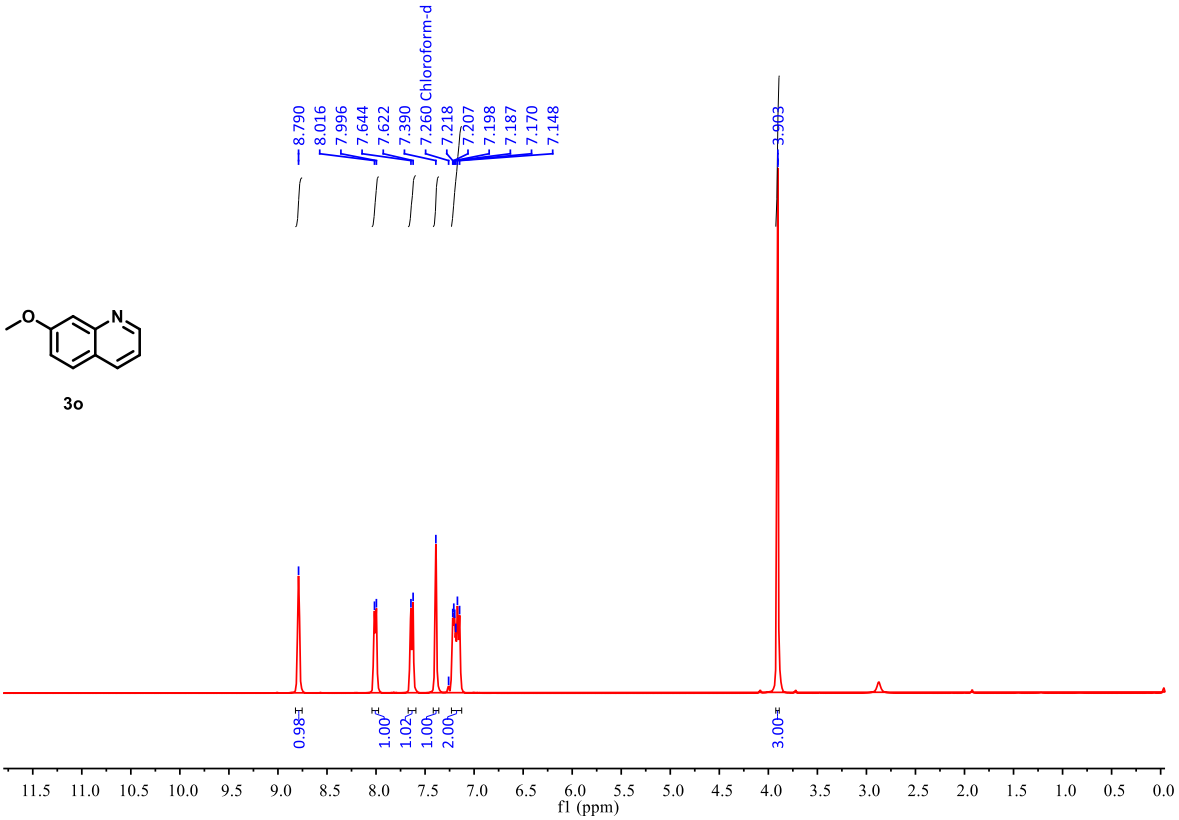
^{13}C NMR, 101 MHz, $CDCl_3$



3n

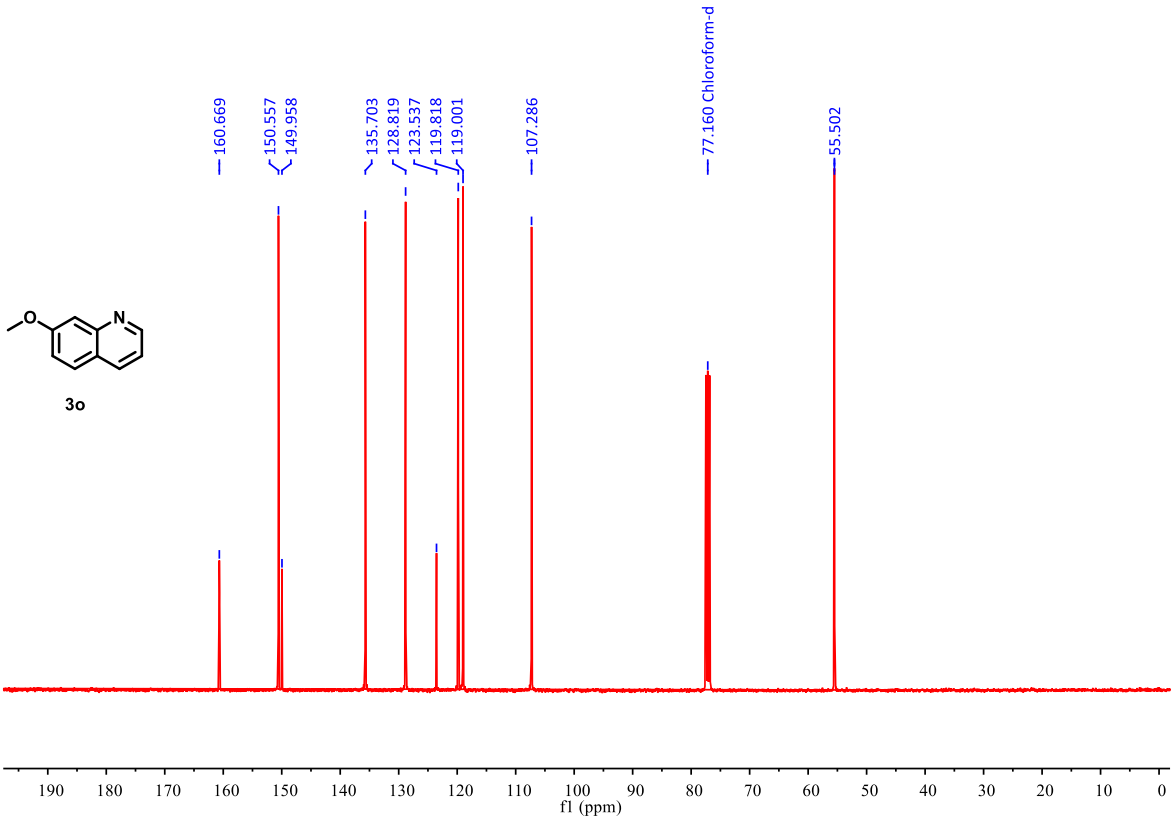
7-methoxyquinoline(3o):

^{1}H NMR, 400 MHz, $CDCl_3$



3o

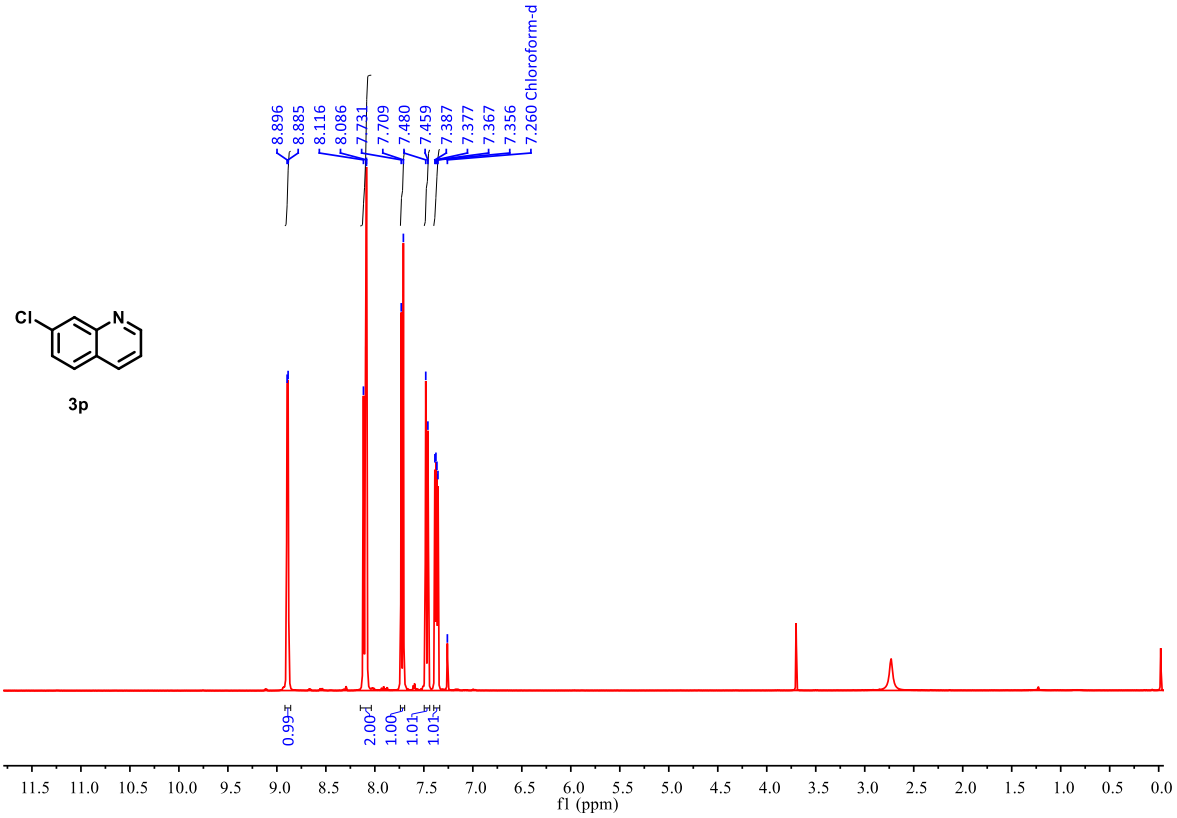
^{13}C NMR, 101 MHz, $CDCl_3$



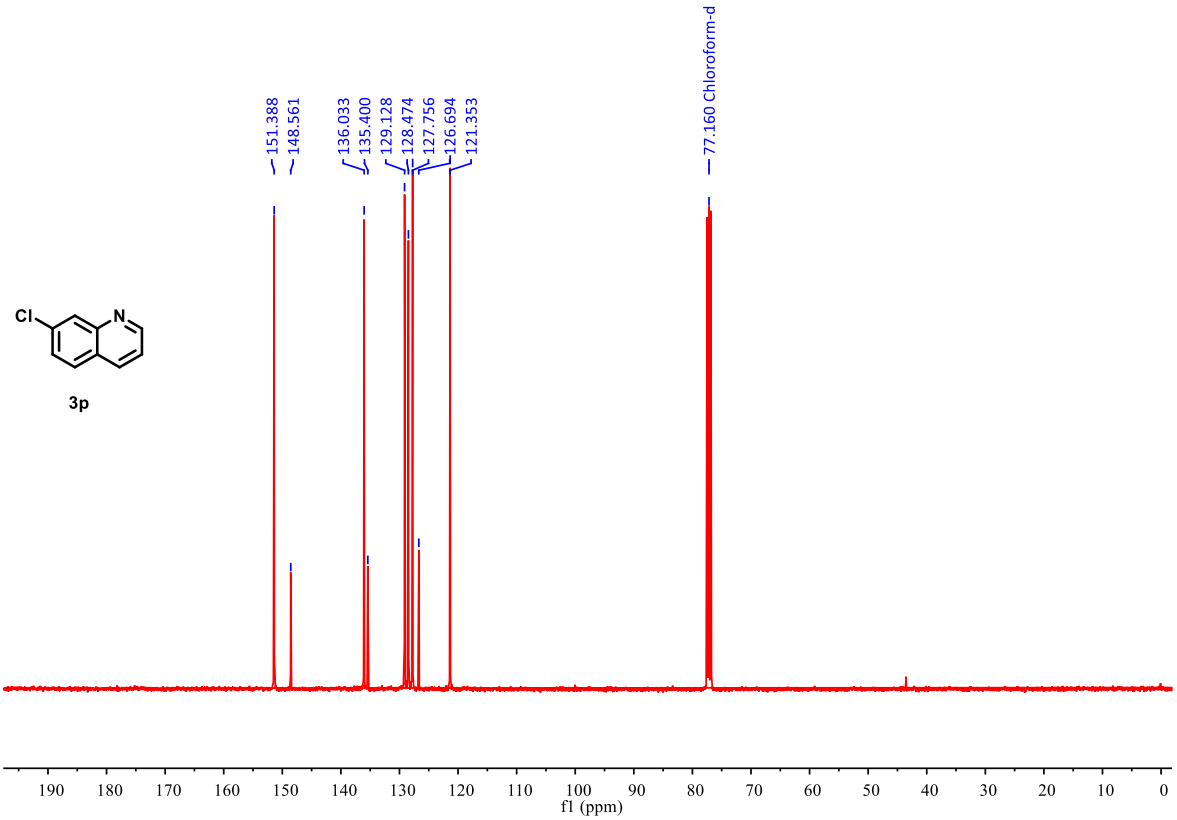
3o

7-chloroquinoline(3p):

^{1}H NMR, 400 MHz, $CDCl_3$

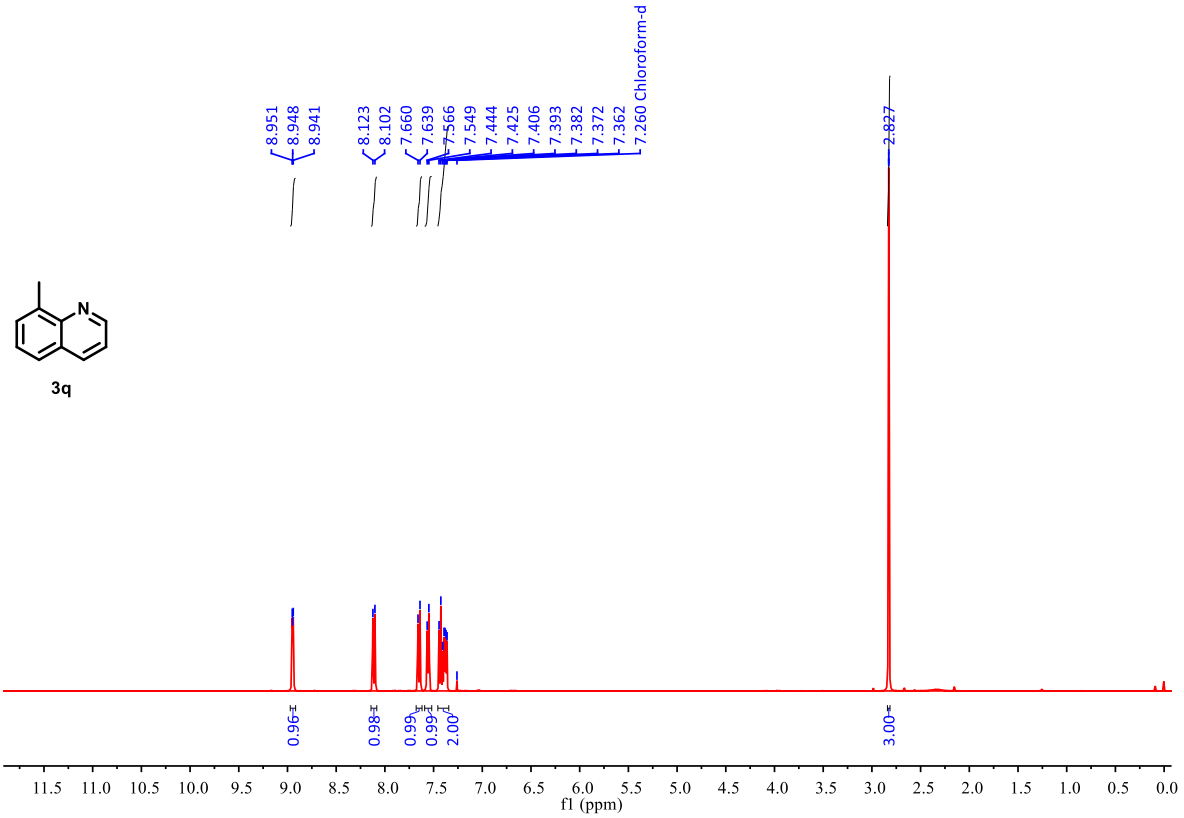


^{13}C NMR, 101 MHz, $CDCl_3$



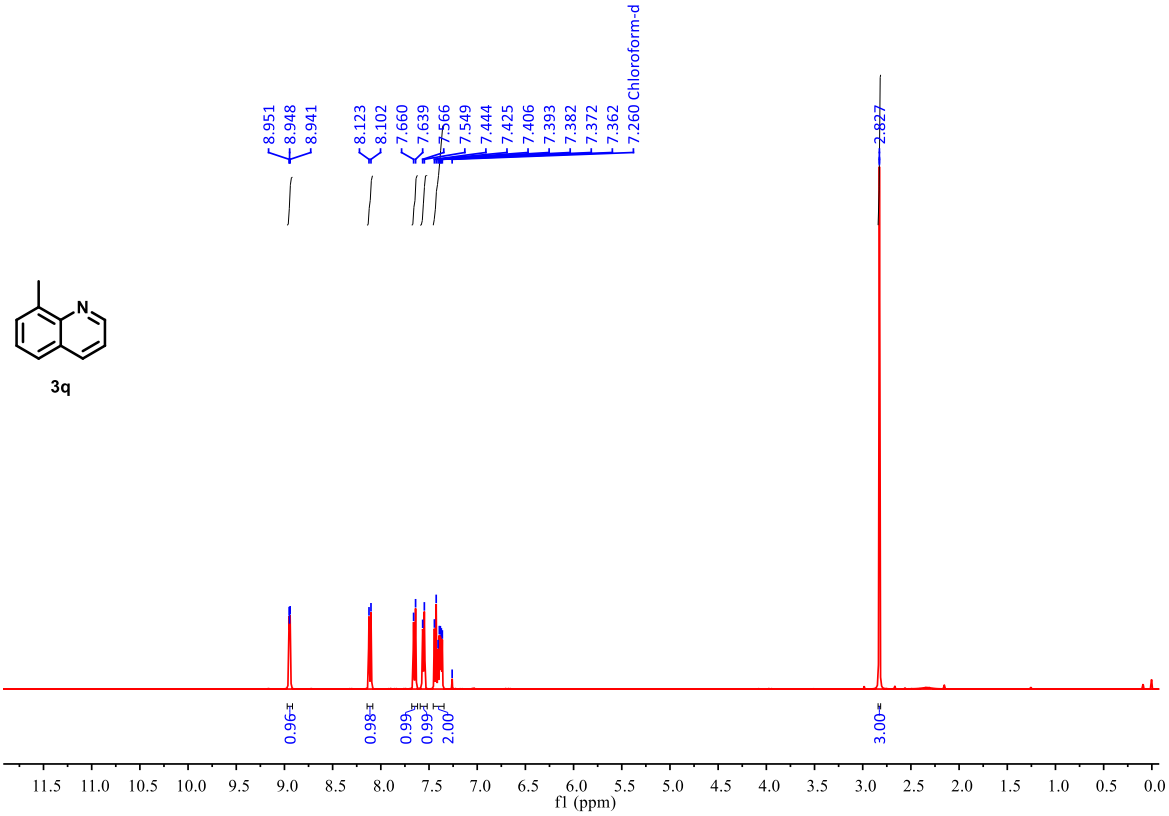
8-methylquinoline(3q):

^{1}H NMR, 400 MHz, $CDCl_3$



3q

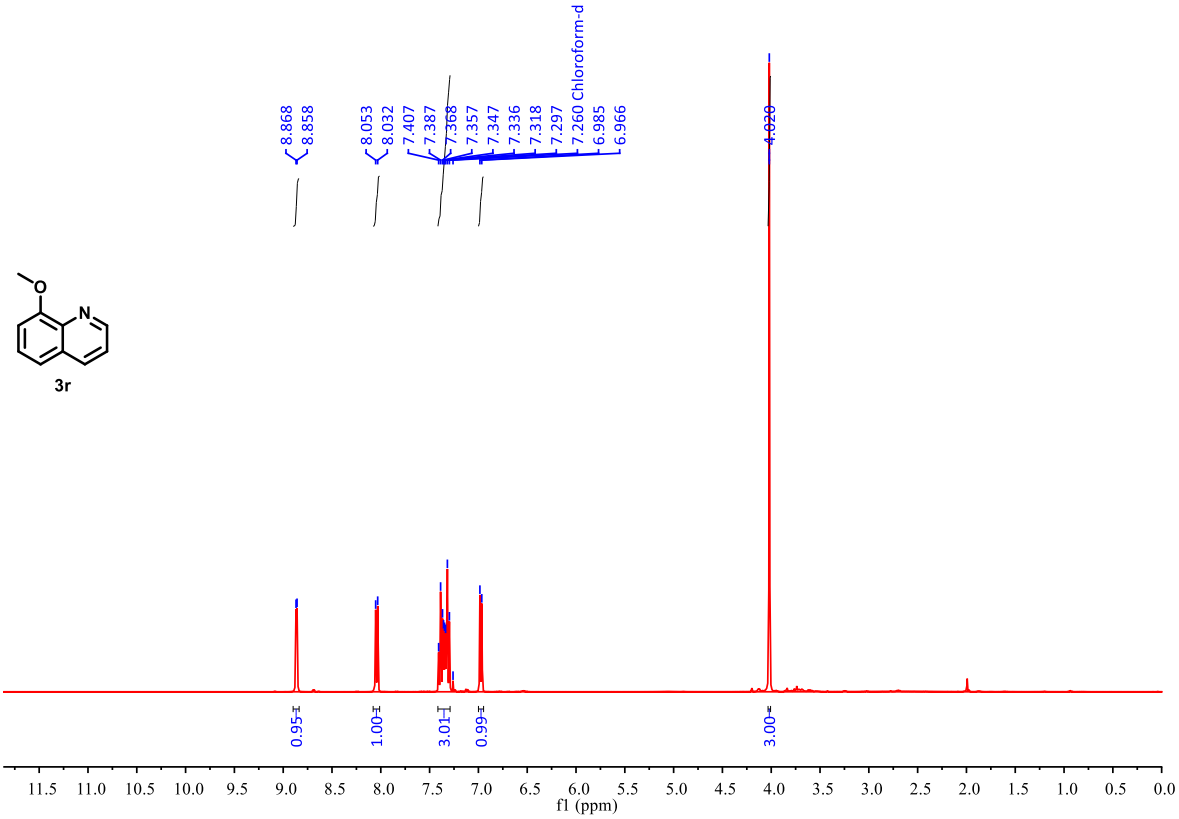
^{13}C NMR, 101 MHz, $CDCl_3$



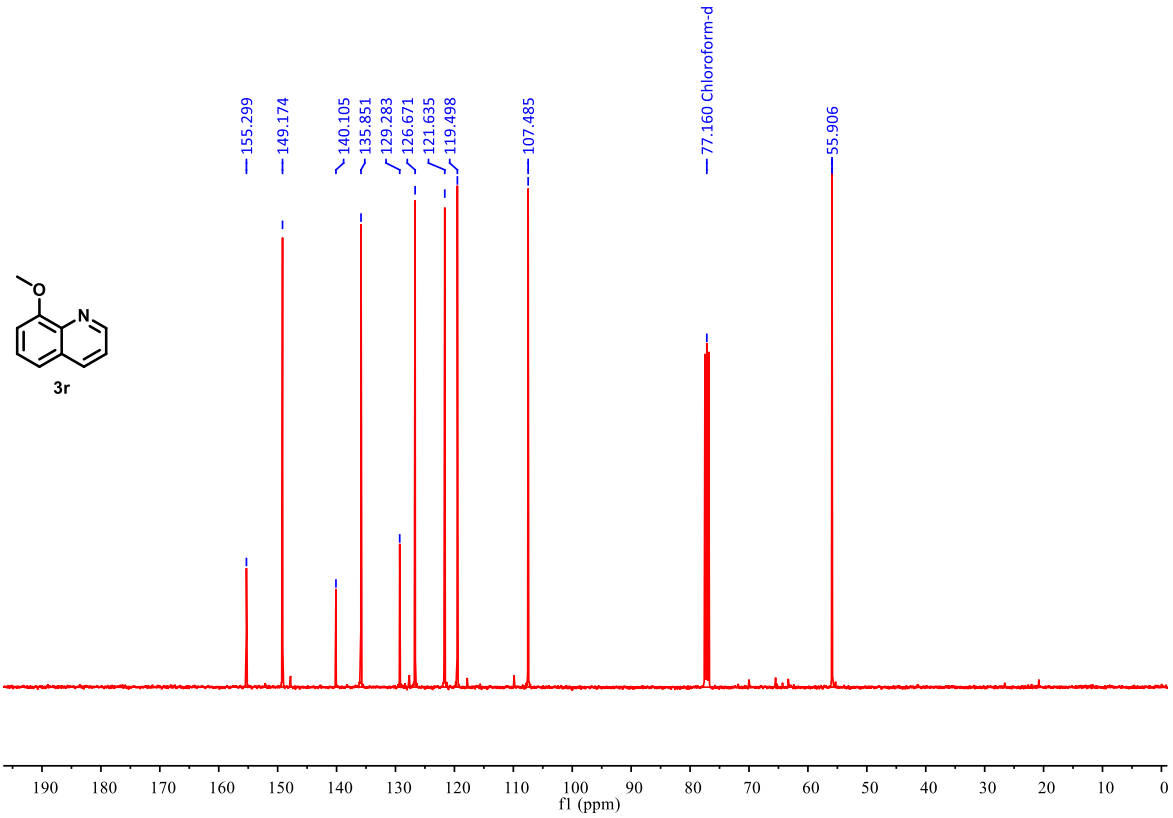
3q

8-methoxyquinoline(3r):

^{1}H NMR, 400 MHz, $CDCl_3$

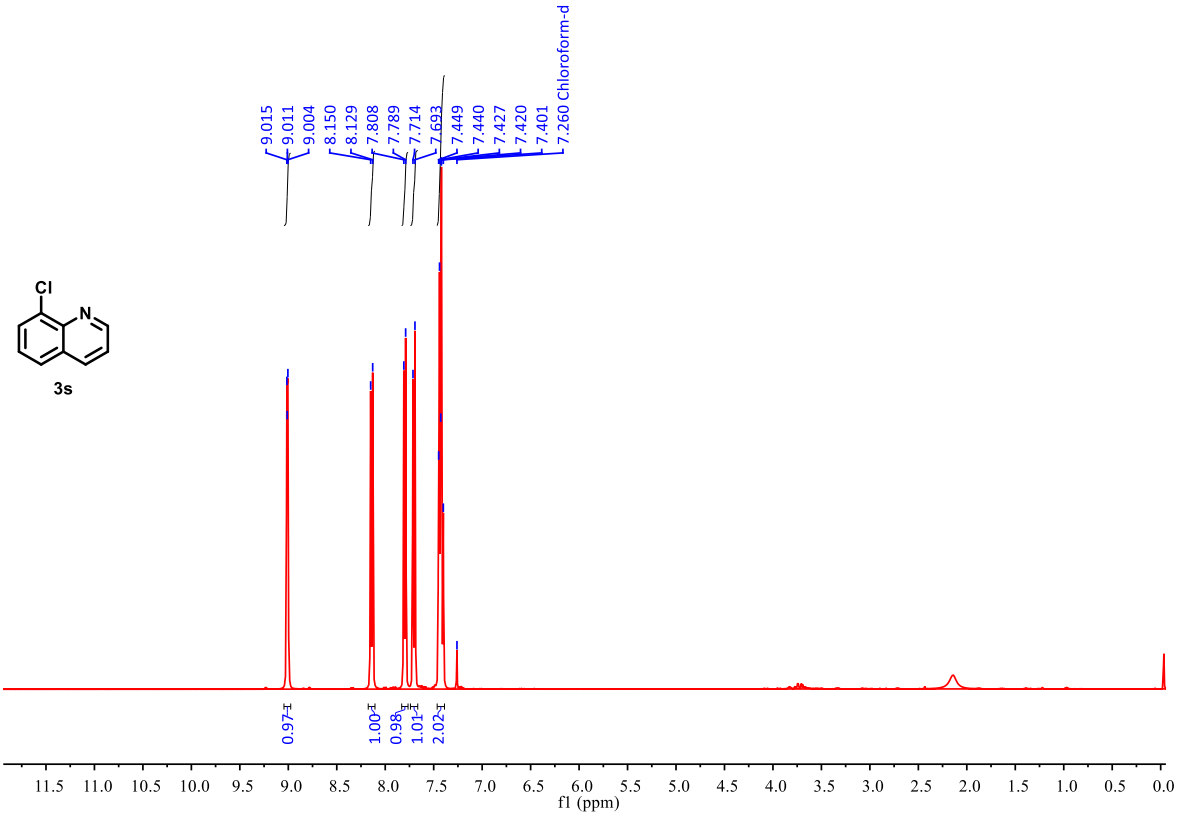


^{13}C NMR, 101 MHz, $CDCl_3$

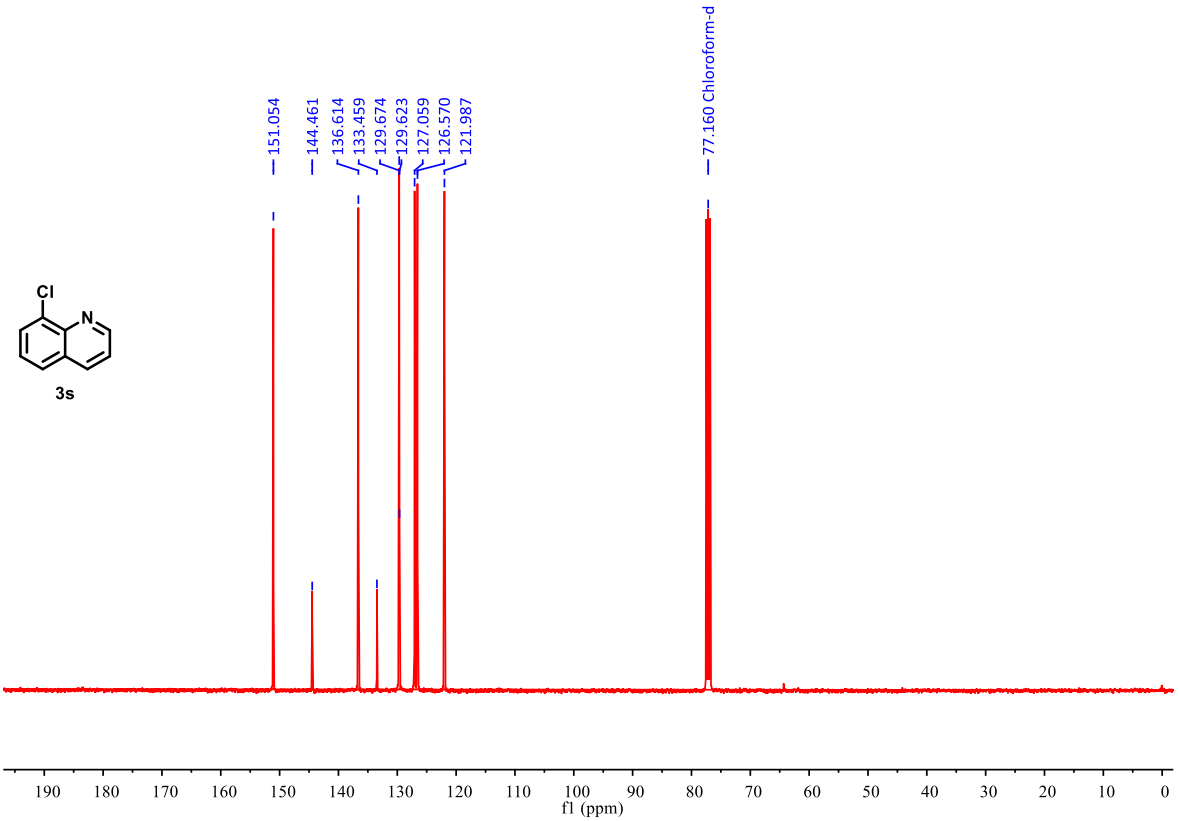


8-chloroquinoline(3s):

^{1}H NMR, 400 MHz, $CDCl_3$

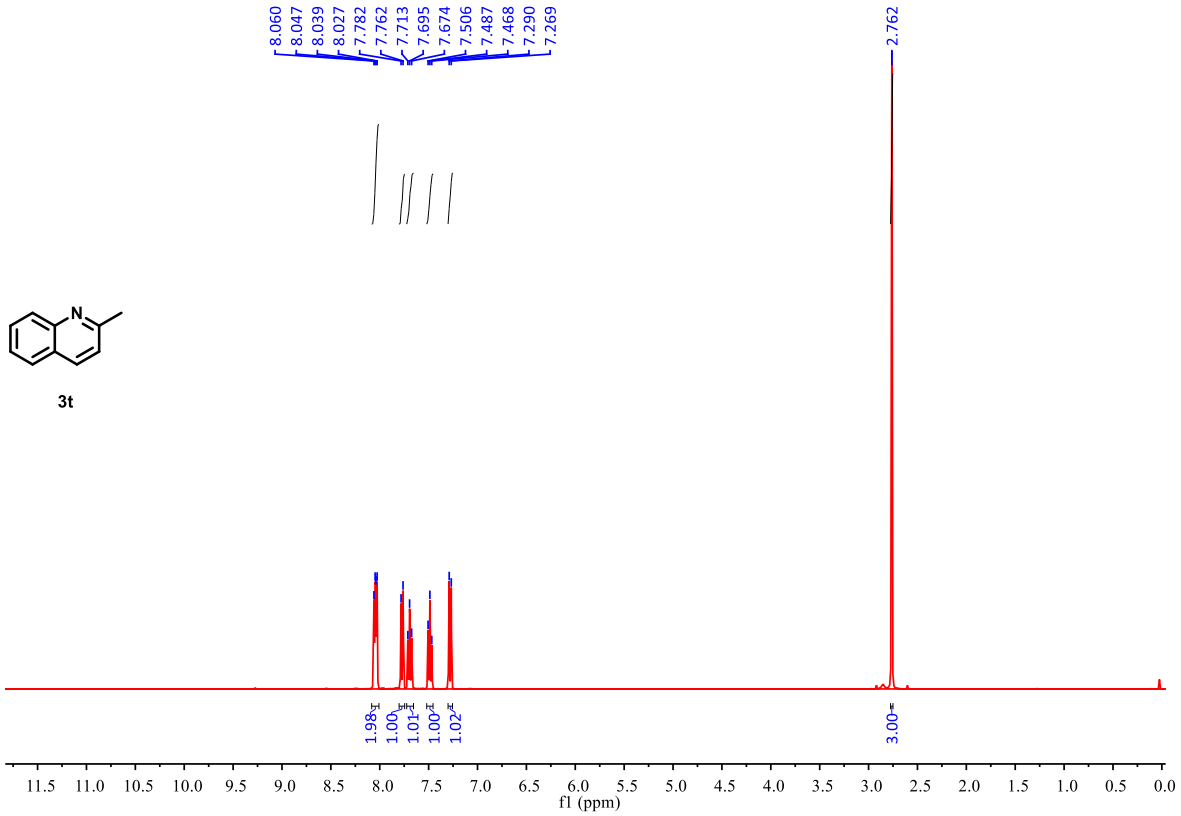


^{13}C NMR, 101 MHz, $CDCl_3$



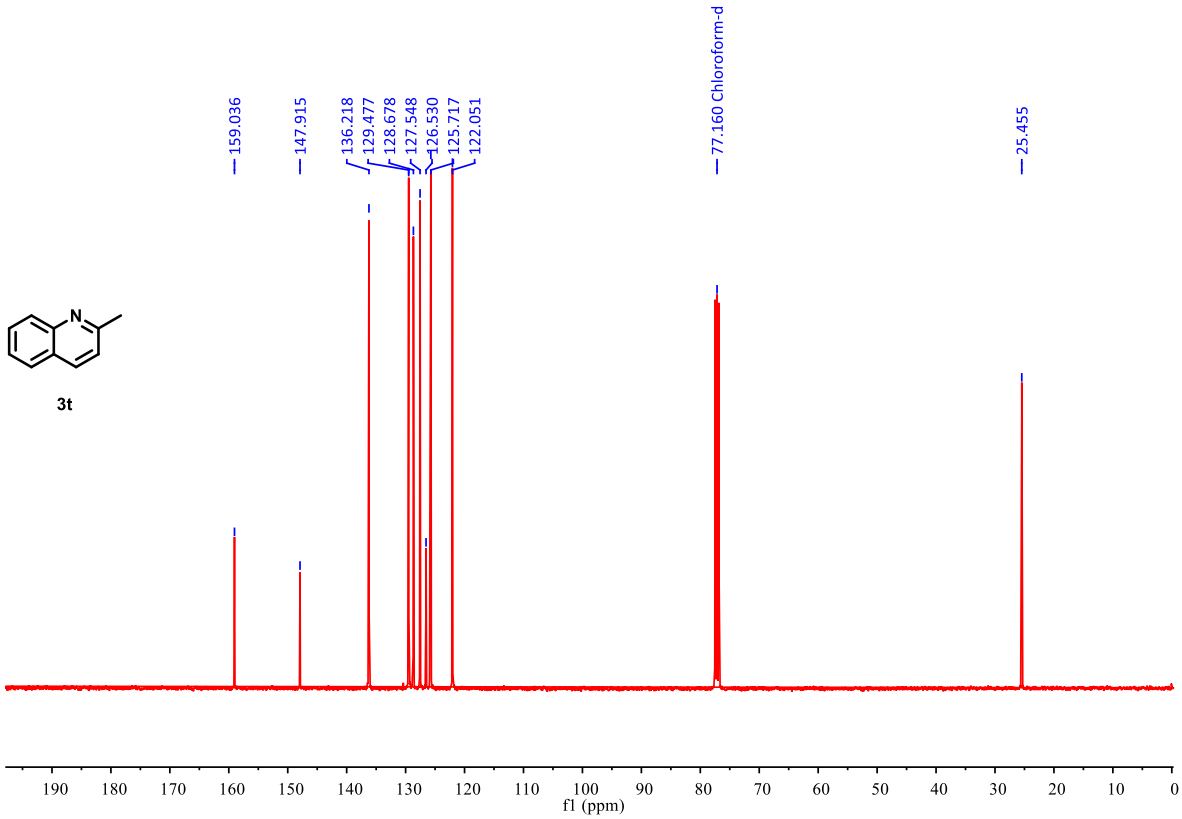
2-methylquinoline(3t):

^{1}H NMR, 400 MHz, $CDCl_3$



3t

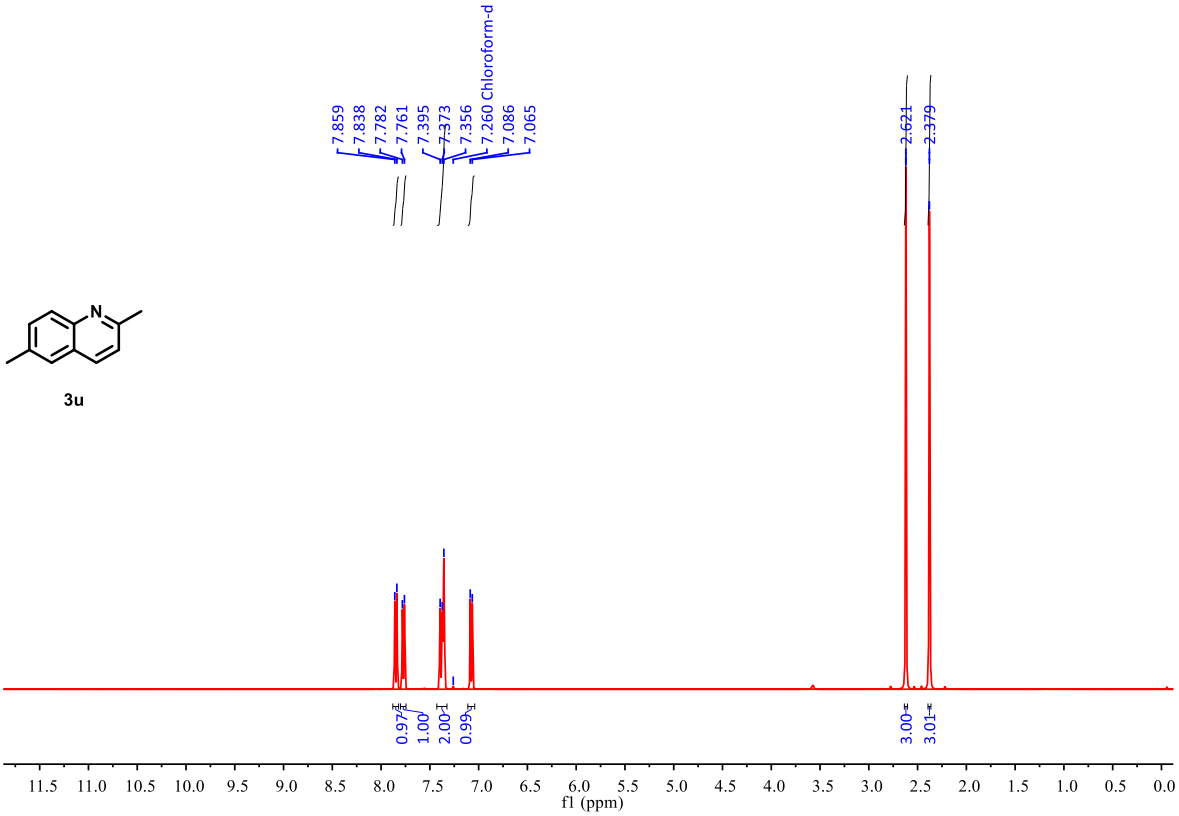
^{13}C NMR, 101 MHz, $CDCl_3$



3t

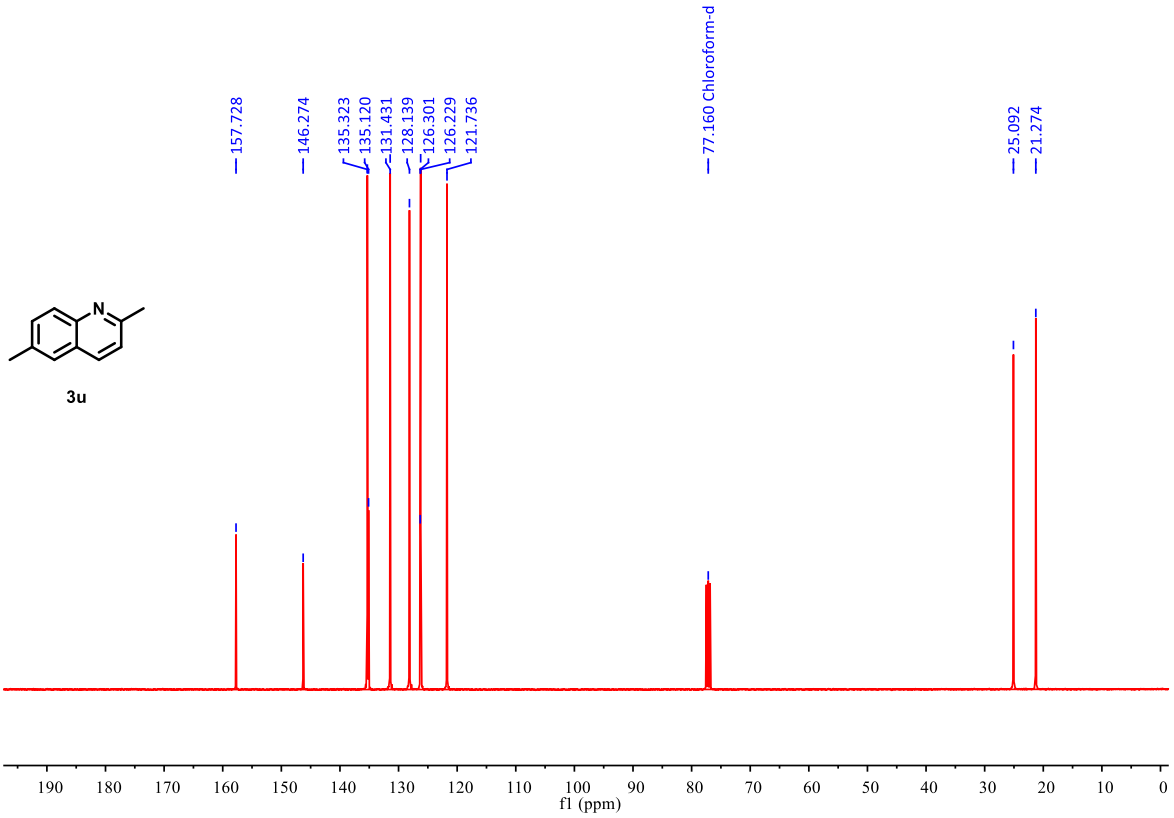
2,6-dimethylquinoline(3u):

^{1}H NMR, 400 MHz, $CDCl_3$



3u

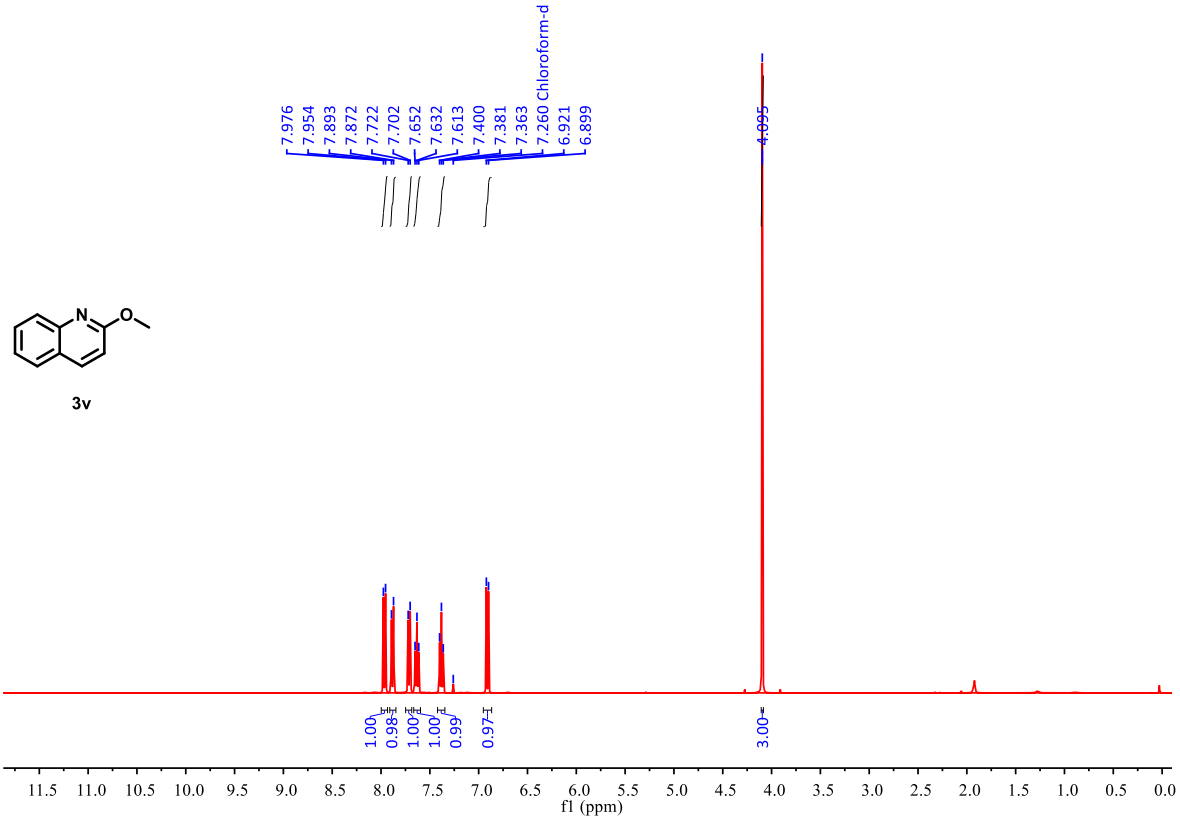
^{13}C NMR, 101 MHz, $CDCl_3$



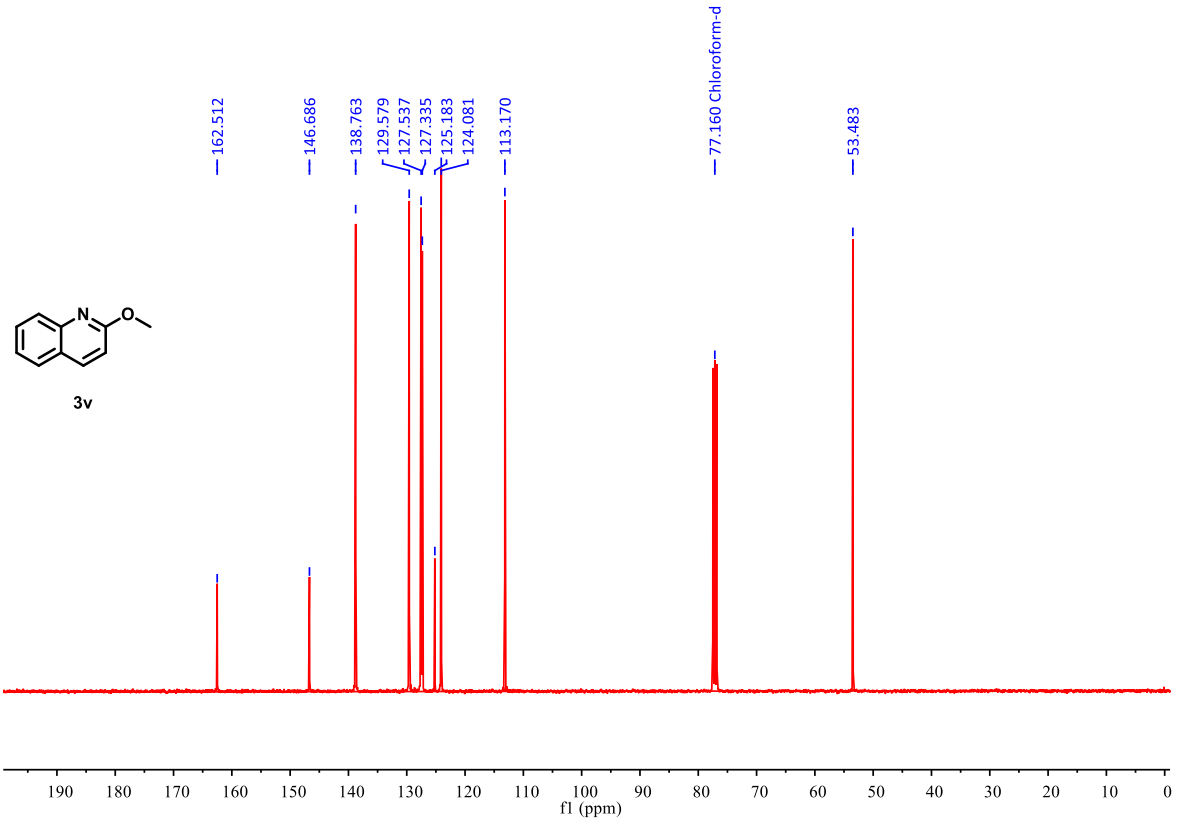
3u

2-methoxyquinoline(3v):

^{1}H NMR, 400 MHz, $CDCl_3$

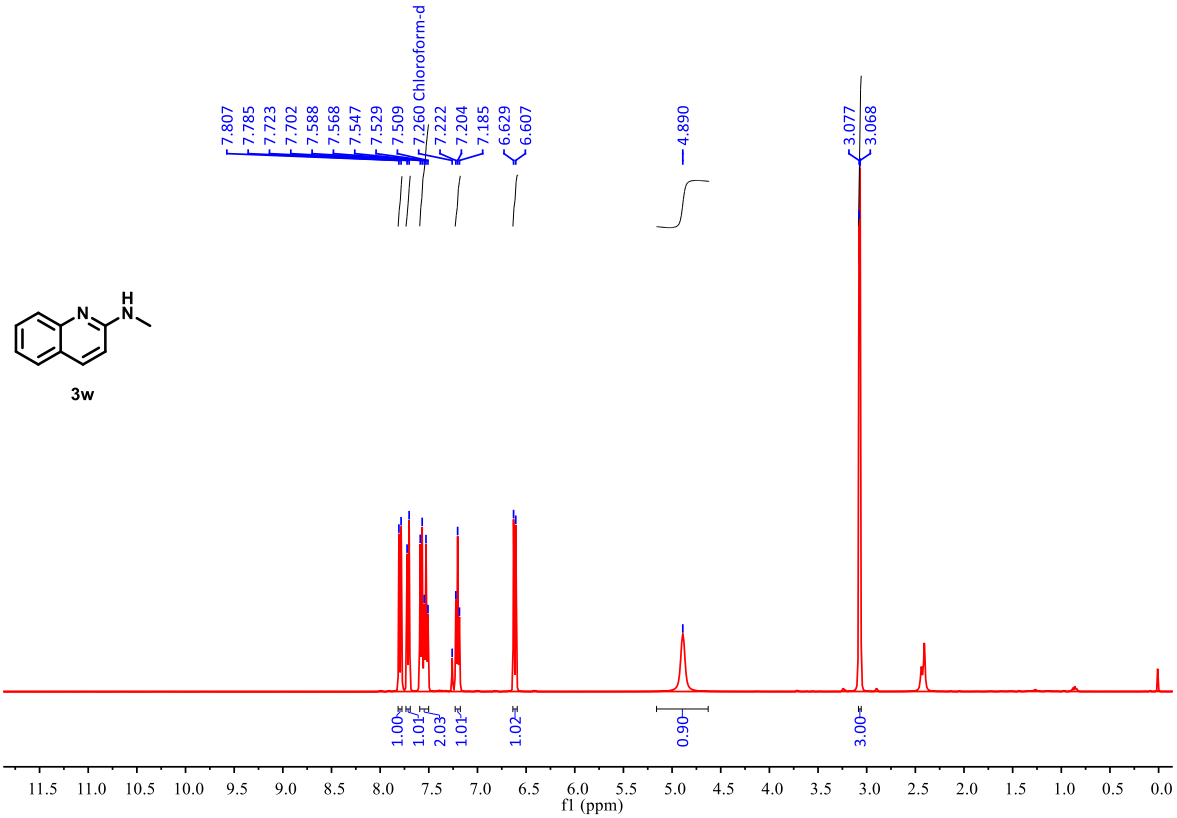


^{13}C NMR, 101 MHz, $CDCl_3$



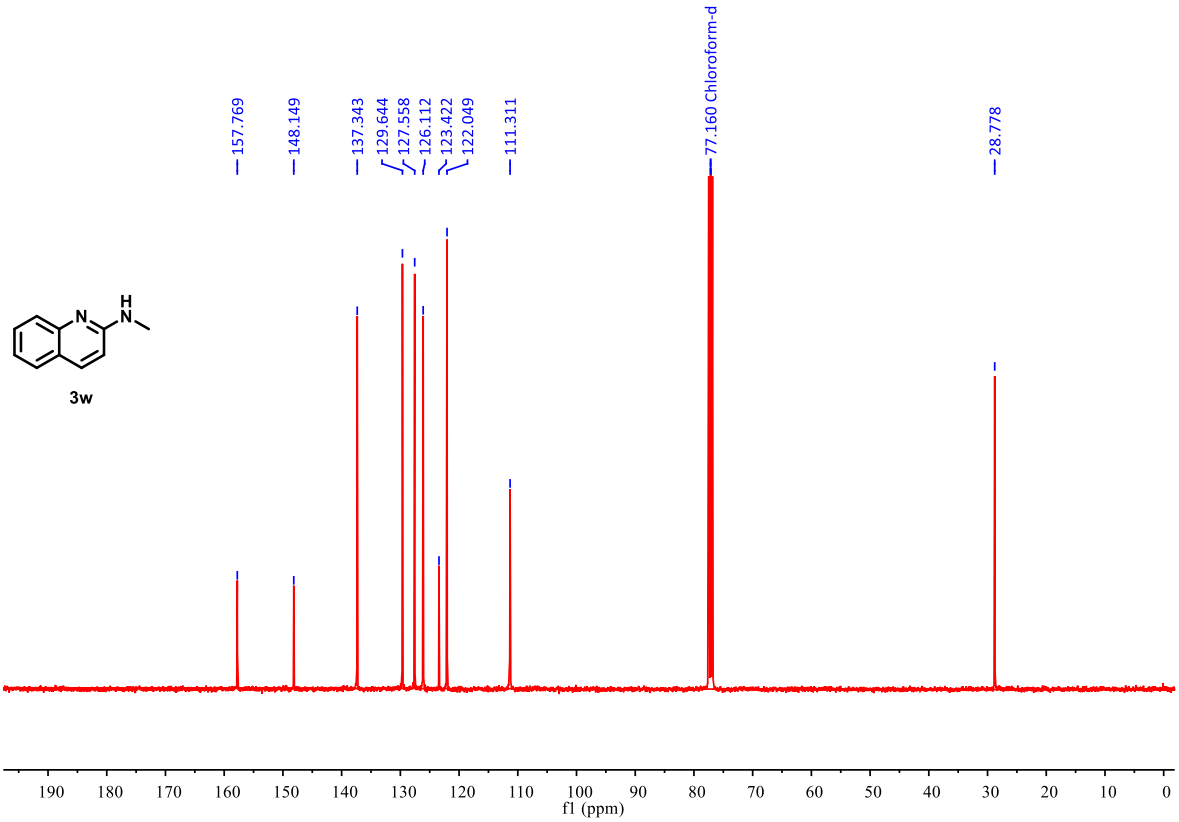
N-methylquinolin-2-amine(3w):

^{1}H NMR, 400 MHz, $CDCl_3$



3w

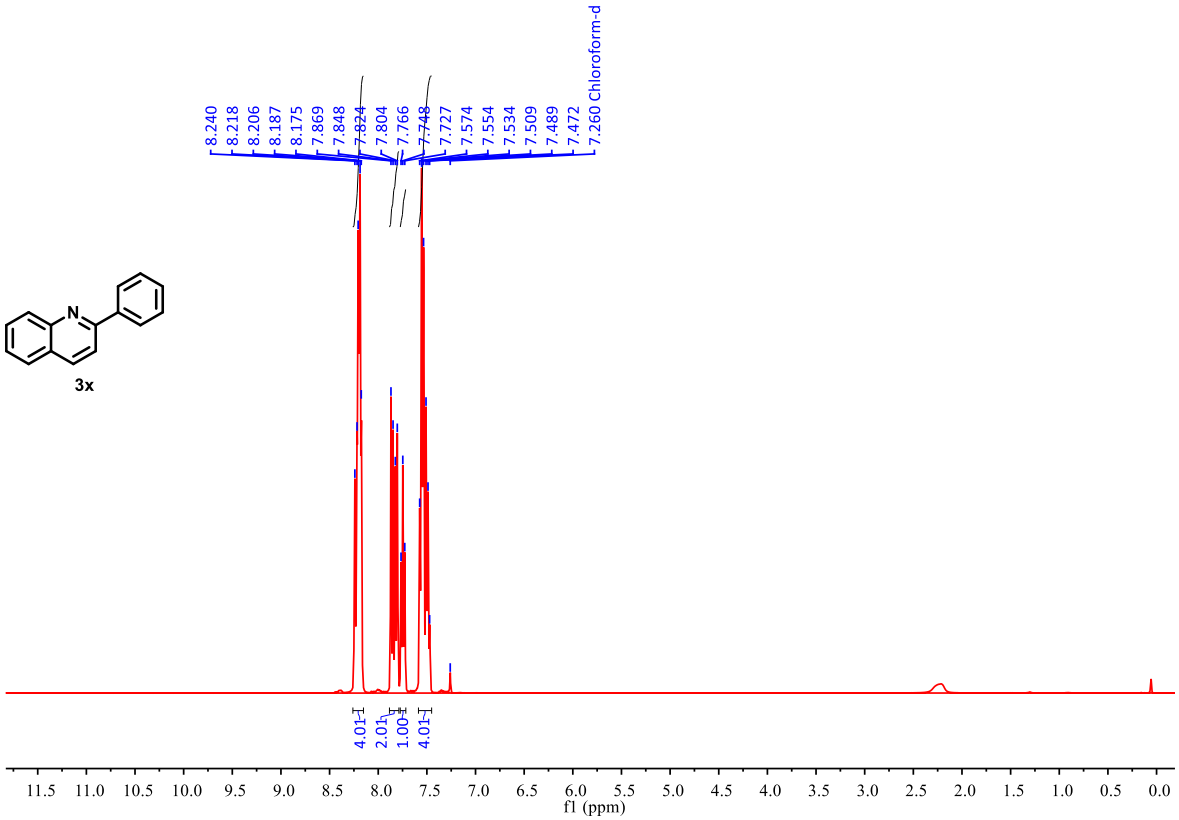
^{13}C NMR, 101 MHz, $CDCl_3$



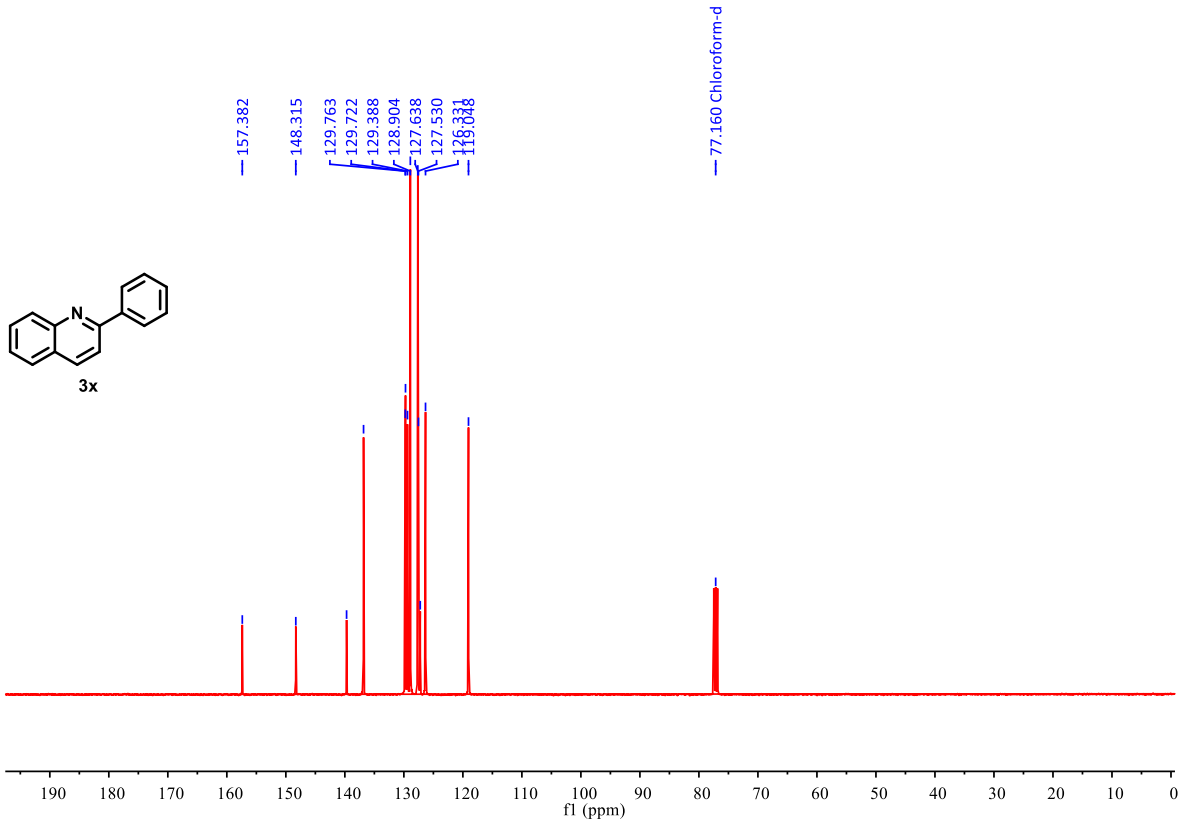
3w

2-phenylquinoline(3x):

^{1}H NMR, 400 MHz, $CDCl_3$

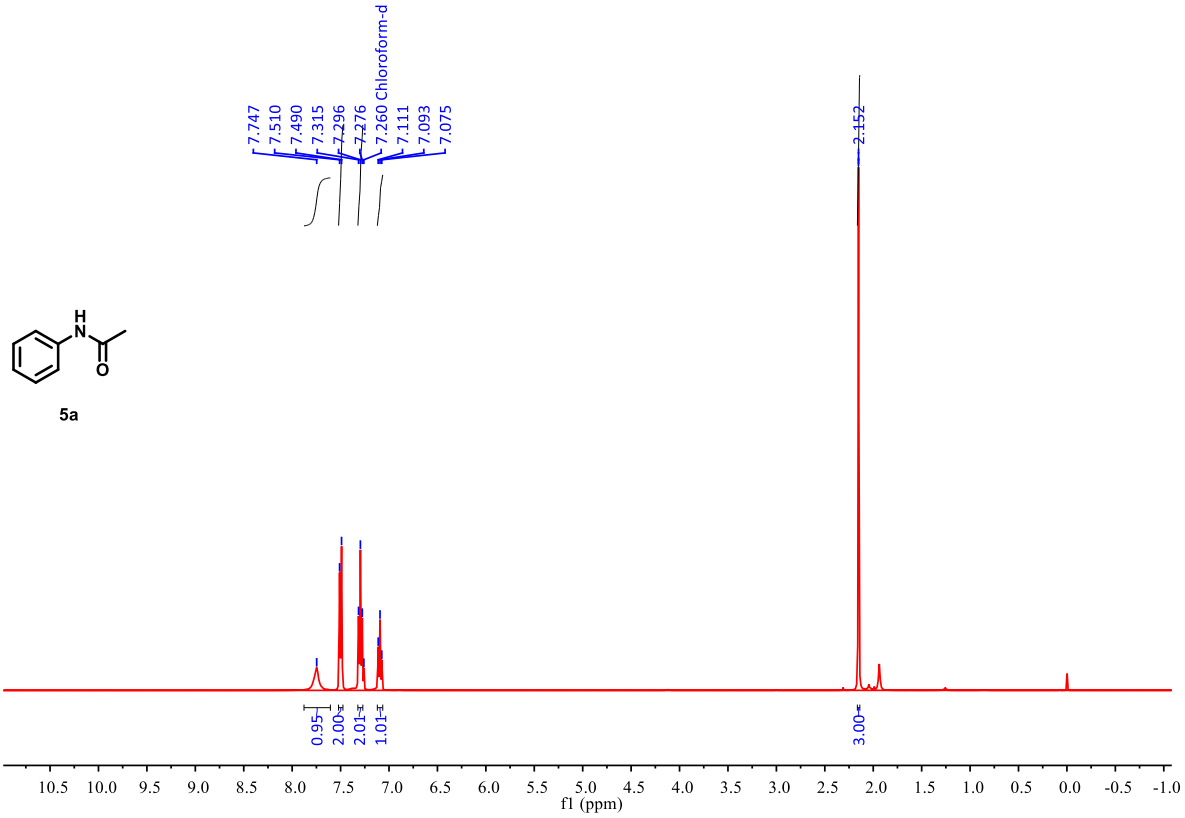


^{13}C NMR, 101 MHz, $CDCl_3$



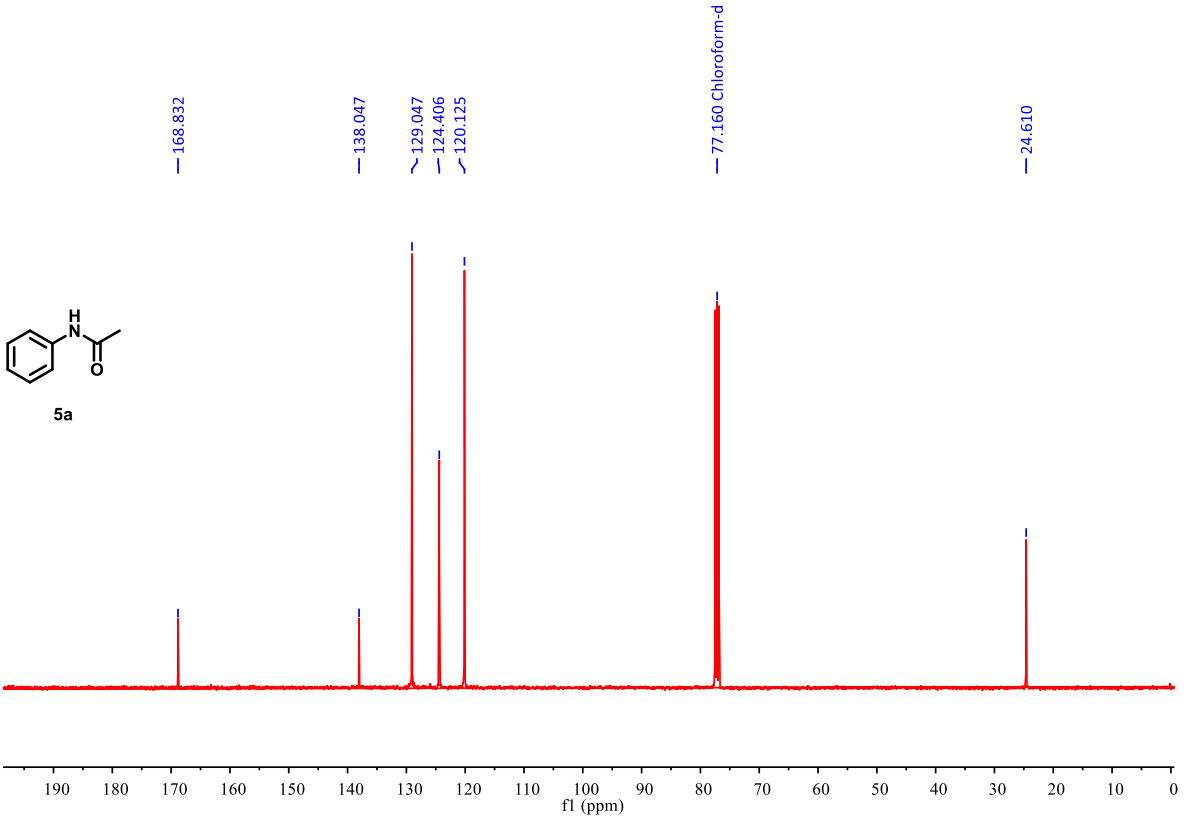
N-phenylacetamide(5a):

^{1}H NMR, 400 MHz, $CDCl_3$



5a

^{13}C NMR, 101 MHz, $CDCl_3$



5a